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AMERICAN ANTIQUITY

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A PRELIMINARY REPORT ON COASTAL TAMAULIPAS, MEXICO

RICHARD S. MACNEISH

THIS article represents a preliminary statement of the results of the archaeological survey of the Sierra de Tamaulipas, coastal Tamaulipas north of the Soto la Marina River and the adjacent portion of Texas, which was conducted from November, 1945 through June, 1946 under the auspices of the University of Chicago.[1] Since a long interval of time will probably elapse between the analysis of the archaeological materials and the final publication, it seems advisable to put this summary into print.

Basic to the purpose of the survey and to the problems with which it was concerned was the assumption that there were cultural relations between the people of the Southeast and the more complex cultures of Mexico. Numerous writers have supported the validity of this assumption.[2] The area covered by the present survey lies between the two above mentioned areas and is, of course, intimately concerned in the problem of the Southeast-Mexican relationships. It was felt that a survey of this area might solve the following problems:

1. The route of the contacts between Mexico and the Southeast.
2. The time of these contacts.
3. The group or groups involved in the contacts.
4. The type of contacts that occurred.

In presenting the results of the survey, I have arranged the data so that the culture complexes presenting negative evidence appear first. This will be followed by a brief description of the Pueblito complex that hints of possible contacts between the areas. The final section of the descriptive materials will be concerned with those cultures which offer definite contributions. In the comparative section of this paper, I will restate the findings that are pertinent to the problems and will give additional facts in confirmation. These materials, I believe, make definite contributions toward the solution of the problems, and future work, particularly along the lines suggested in the summary, should contribute even more.

DESCRIPTIONS

In the following pages, the Abasolo, Repelo, Los Angeles, and Diablo culture complexes will be rather fully described. The descriptions will indicate not only that these cultures are of minor importance in showing connections between Mexico and the Southeast, but also will make available data that can be of use to those studying archaeological manifestations in the surrounding area.

The Abasolo complex is composed of materials from thirty-five sites. This complex ap-

[1] I am indebted to the sponsors of this survey, Dr. F. C. Cole and Dr. Robert Redfield of the Department of Anthropology of the University of Chicago. Thanks are also due to Sr. Enrique Juan Palacios, formerly Director of Monumentos Prehispánicos, and Sr. Ignacio Marquina, Director of the Instituto Nacional de Antropología e Historia of the Republic of Mexico, who generously gave permission for the archaeological reconnaissance of Tamaulipas and facilitated the delivery of a portion of the archaeological materials to the United States for further study. The Department of Anthropology of the University of Texas kindly made their laboratories available for use in the analysis of the materials, and I am most grateful for the invaluable information proffered by the members of the staff, Mr. Thomas Campbell, Mr. J. Charles Kelley, and Mr. Alex Krieger. Acknowledgment and thanks are also extended to Sr. Pedro Armillas, Sr. Wilfredo Du Solier, Dr. Gordon Ekholm, Dr. James B. Griffin, Dr. J. Alden Mason, Sr. Eduardo Noguera, Sr. Pablo Martínez del Río, Sr. Roberto Pavón, and Sr. Gabriel Saldivar for their assistance in details preliminary to the exploration and for their help in the interpretation of the materials. In conclusion, I wish to express my indebtedness to the citizens of the state of Tamaulipas, Republic of Mexico, for their unfailing hospitality and cooperation, and to my wife, June Helm MacNeish, who participated in the survey.

[2] Krieger, 1945; Waring and Holder, 1945; Phillips, 1940; Nuttal, 1932.

pears to have extended from the Río de las Palmas northward along the coast to the San Fernando River, then inland to Reynosa, and probably northward again into Texas (Fig. 1, III).[3] The western extension of the complex is not well defined; I know only that it extended at least fifty miles inland, except in the Sierra de Tamaulipas region. Three types of projectile points characterize this complex, and two are particularly numerous. One of the two dominant forms is a triangular point with slightly convex sides and a straight base. It is 1 to 1½ inches long, ⅛ to ¼ inch thick, and ¾ to 1¼ inches wide. The chipping is poorly done, and secondary retouching is rare. The other dominant style is a point similar to the first in all respects except that the base, instead of being straight, is outcurving, often semicircular. Appearing also as part of this complex is a smaller point with a triangular body and a wide (¼ inch long, ½ inch wide), straight stem. The shoulders are at right angles to the stem. In this style, too, the chipping is poor. With these three types other points were also found, but not in great enough numbers to warrant inclusion in this complex. Two types of these other points, however, may be recognized as trade points. One is the small triangular type of the Brownsville complex (to be described later), while the other has been named Langtry Stemmed, and is a style of point dominant in the Pecos River focus.[4] Besides points, numerous flake scrapers and small humpbacked scrapers are included in this complex. Five burials were discovered; they were semiflexed, in shallow pits, and without burial furniture. Pottery does not appear to have been part of this complex, although sherds were discovered at many of the sites. Two of the sherds are of Period VI in the Huasteca; one is Tancol Polychrome, and the other, Huasteca Black-on-White. There are also three red ware sherds from the Pueblito culture. The remainder of the sherds, some of which are wheel-made, are not identifiable. The presence of the Huasteca sherds at these sites, and the fact that points of the Abasolo complex are found at Period VI Huasteca camps in the area, seems to indicate that this group lasted into Period VI and possibly until historic times. The earlier extension of this culture is determined by the Pecos River points, dated by Kelley (on the basis of datable sherds from the Southwest in the sequentially following Chisos focus) as not later than about 1000 A.D.[5] The scarcity of this type of point in the Abasolo material and its frequency in the Repelo complex may indicate only a very slight overlap. Assignment of this date to the Abasolo complex is confirmed by the fact that a large number of Abasolo points are present in late sites of the Pueblito complex, which is placed roughly in late Huasteca IV, or early V, or late Teotihuacan and early Tula-Mazapan times, estimated by Acosta to be around 900 A.D.[6] I therefore believe that this complex may be dated from probably not earlier than 800 A.D. to historic times. Stratigraphically, as shown by sites in or along arroyo banks, the Abasolo complex is over the Repelo complex and under the Brownsville complex in the Rio Grande delta. A clearer definition of the complex and its temporal and spatial relationships might be obtained by digging one of these sites. At present this culture (as well as the Repelo complex) appears related to, or is the same as, the Coahuil-

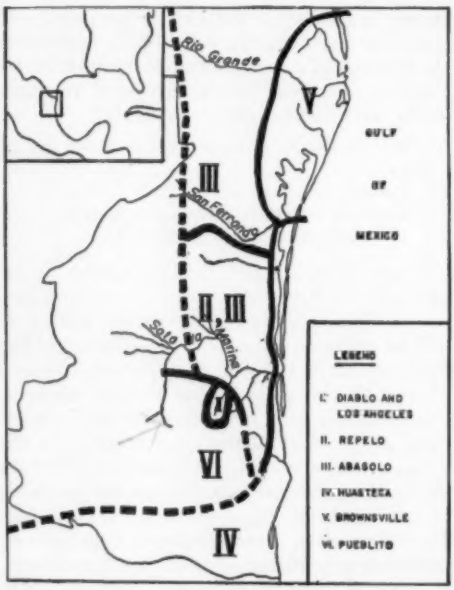

FIG. 1. Location of archaeological complexes in coastal Tamaulipas, Mexico.

[3] Sayles, 1935; see the discussion of the Coahuiltecan phase.

[4] Kelley, Campbell, Lehmer, 1940, p. 26.

[5] Kelley, Campbell, Lehmer, 1940, p. 162.

[6] Acosta, 1945.

tecan phase, described by Sayles. I have refrained from using his ethnic terminology since no conclusive evidence for this tribal identification has appeared in print.[7]

The Repelo complex, of which only eleven sites have been found, appears to be related to the Abasolo complex. It is located for the most part between the Soto la Marina and the San Fernando Rivers, from the coast inland (Fig. 1, II). Kelley has pointed out that a culture very similar to it in both content and time is found in Texas in the area roughly between San Antonio and Laredo.[8] The projectile points of the Repelo complex consist of the following types:

1. A large (2 to 3 inches long, 1 to 1½ inches wide), thin (¼ inch or less in thickness), triangular point with slightly convex sides and a square base, showing good primary and secondary chipping.

2. A point of the same general form as the first except for its round base. (Both of these types are large, better editions of the dominant forms in the Abasolo complex.)

3. A large (2 to 3 inches long, 1 to 1½ inches wide), nicely chipped point with convex sides and base, and two side notches, chipped from opposite sides, adjacent to the base.

Flake scrapers occur with this culture, but there is no pottery. Numerous Langtry Stemmed points also appear, and, for this reason, I believe it to be of the same time period as the Pecos River focus, 500 to 1000 A.D., and to be before—possibly even ancestrally related to—the Abasolo complex.

In the caves along the Canyon del Diablo, which runs through the Sierra de Tamaulipas, three styles of cave pictographs were seen, but only two artifact complexes were ascertained (Fig. 1, I). One complex lacks pottery. The stratigraphic position of the two complexes is well known since both were found in a test pit excavation. The later of the two, called the Los Angeles complex, includes small, delicately-made projectile points, ¾ to 1 inch long and ¼ to ½ of an inch wide. They have concave bases, parallel concave sides, and abrupt convex points. Oval, humpbacked scrapers are also found in this stratum, as well as ten sherds having a porous paste, and burnished and brushed surfaces. The earlier Diablo complex contains large, crude blades, 3 to 4 inches long, made of large primary flakes with no secondary chipping. The sides are parallel; the bases, round; and the points, abrupt. With these points there are also long (3 inches), oval, humpbacked scrapers and round, snub-nosed scrapers. On the basis of typology and the fact that the Pueblito ruins surround these complexes, yet contain material from neither of them, I am inclined to believe that the Los Angeles complex is later than the Pueblito complex, while the Diablo complex is earlier, because of its lack of pottery. Complete excavation of the cave tested, which shows stratigraphy, might clarify the situation.

The Pueblito culture is situated in the Sierra de Tamaulipas; it does not extend north of the Soto la Marina River nor east of the Río de las Palmas, but its southern and western boundaries have not been determined (Fig. 1, VI). Eight ruins were visited and tested; in them we were able to distinguish three ceramic periods: early, middle, and late. Writers have previously identified these ruins as Huasteca, probably because of the great similarity of the architecture. However, according to Ekholm, Du Solier, and Pavon, the pottery and artifacts are quite distinct. Since the cultural assemblage of this group is very complex, I shall only briefly outline it.

ECOLOGICAL SITUATION

1. The ruins are usually located upon the summits of steep-sided hills. Occasionally, one or two houses may be seen in the flood plains of the canyons about the hills. It would rather appear, however, that the majority of the houses were built upon the tops of the hills for a definite purpose, perhaps defensive.

2. Situated in the ruins are usually one or two large circular depressions. The present inhabitants of the area refer to them as *tanques*. Since these depressions still hold water, there can be little doubt that they at least supplemented the water supply. Whether these reservoirs were built after the occupation of the site, or whether they are natural and are the reason for the inhabitants' selection of the site cannot be determined at present.

3. The arrangement of the communities is governed by the geographical features of the hills, although evidence of community planning is seen. Somewhere in every ruin will be found a level portion which was used as a plaza. Surrounding this square or rectangular plaza are small pyramids or large circular masonry house platforms. Usually a large pyramid is located medially on one side of the plaza. Other structures are situated along the tops of ridges and occasionally there will be other series of house platforms on the sides of the hill, just below the top. These appear to form a terrace, and in a few cases actually do, since the houses are connected by a stone wall and the area in back of the wall is filled with dirt.

[7] For additional information concerning this complex, see the article by Hughes on pp. 33–9 of this issue. *Editor.*

[8] Kelley, J. C., personal communication.

ARCHITECTURAL FEATURES

1. Pyramids are either round or rectangular in shape. Generally speaking, the large pyramids are round and do not appear to have had masonry structures on top. Stairways are not apparent either. The round pyramids by actual count are less frequent than the rectangular ones. The rectangular type is low (5 to 10 feet in height), steep sided, with a large flat top. Stairs are discernible on one of the shorter sides and in two cases have flanking pilasters. (In both cases, this type of staircase corresponds to the late ceramic period.) The pyramids are most frequently associated with the plaza.

2. The house platforms are circular in shape (10 to 20 feet in diameter) and the sides are composed of vertical walls of masonry (with the exception of one site of the early ceramic period where the walls are composed of large boulders). The walls are from 1 foot to 6 feet in height. The top of these structures is horizontal and often will be covered by a burned clay floor, occupational debris, and occasional pieces of wattle and daub. Below these top surfaces are large rocks, dirt, and refuse apparently used as fill. Tangent slab steps lead from the ground to the platform. These steps are associated only with late ceramic remains.

3. Two other architectural features are present. One of these is a caracol-like structure. The body is identical to the house platforms, being about 8 feet high, 20 feet in diameter, and with steep masonry walls. However, the difference lies in the staircases. Series of steps are found on opposite sides of the platform. These curving staircases rise parallel to the sides of the structure, and the bases of the staircases face in opposite directions. The other structure appears to have a series of slabs of rock arranged in a rectangle.

4. As a final architectural feature, there are stone walls that connect two or more house platforms situated at the same level on the side of a hill. These act as retaining walls for dirt piled against one side, thereby making terraces.

STONE OBJECTS

1. Metates have a slightly sloping grinding surface about twice the length of the more sloping posterior portion. This posterior portion rises upwards at an angle of 45° to the grinding surface. On the basal side, there is a ridge on the obtuse angle. This ridge runs from side to side, serving as a support and tilting the grinding surface. Looking down from above, the implement appears to be rectangular with the ends about half as long as the sides. Associated with these metates are cylindrical roller manos.

2. Mortars (called by the local inhabitants *ollas de piedra*), also appear in this region. These are made of volcanic rock and have a deep bowl shape. The average size is about 1 foot high, with the mouth diameter about the same. The thickness of the sides and bottom is about 2 inches. Found in the ruins are numerous bell-shaped pestles. These may have been used in the large stone mortars.

3. Four large (3 inches long) oval-shaped knives were discovered. They appear to be cores with secondary retouching on one end forming a very dull point. One small obsidian-flake knife, rhombohedral in shape, was also found. The projectile points are of six main types. One type has a flaring stem, a poorly defined shoulder, and convex sides. The specimens are about 2 inches long and ¾ inch wide. Present also are the triangular, round based, and stemmed points which are characteristic of the Abasolo complex. These types, incidentally, are associated with the late Pueblito ceramic period. The other two styles are those large triangular and large round based types prevalent in the Repelo complex. All specimens of these last two were on a site of predominantly early Pueblito pottery.

MISCELLANEOUS CLAY OBJECTS

1. Pottery discs with a hole in the center, made from sherds, are fairly common.

2. A cylindrical clay flute with holes pierced on one side was discovered.

3. Part of a rattle, evidently with a bulbous, hollow body and a short solid stem, lay on the surface of a site.

4. The function of this final group of clay artifacts is rather difficult to determine. These objects are cylindrical bodied, with one end smoothed off to a point while the other end appears to have been attached to some sort of outcurving surface. A narrow aperture runs from end to the other. They are from 3 to 4 inches long.

CERAMIC ASSEMBLAGE

1. *Brushed ware.* In this ware, the paste is friable; the temper is large and granular. The hardness is about 2.0. The surfaces appear to have been brushed by handfuls of grass and twigs. In the earlier periods no conscious attempt seems to have been made to use this brushing as a decorative technique. However, on ollas of the late period, zones of brushing appear with the brushing in each horizontal zone running in a different direction. The shapes of vessels usually fall into one of three types: ollas with globular bodies, outcurving long necks and fairly small mouths; low bowls with straight rims but with sides sloping outward and the bases rounded or flat; bowls with outcurving rims and sides that slope outward. The sides show a definite break about 3 inches from the rim and from there the bottom slopes sharply to a rounded or flat base. Ollas seem to be confined to the middle and late periods.

Also appearing are parts of semicircular upright handles that spring from the lip of the vessel.

2. *Plain ware.* This appears to be sand tempered. The consistency is compact and the hardness is about 3.5. Due to the large amount of temper the sherds have a very sandy feel. The surface has been smoothed. Ollas appear in the middle and late periods. Vertical-sided, overlapping, straight-sided, and outflaring carinated bowls are very common. Two strap handles were noted.

3. *Polished black ware.* The tempering in this type is fine sand in small amounts. The paste is very compact, and the hardness is about 4.0. The surfaces have been highly polished after first being blackened. Decoration is absent except in the late ceramic period, on the sherds of which fine engraved lines are present. The decorative elements are of four types:

a) Triangles pointed toward the rim and filled with crosshatching.

b) Triangles composed of four parallel lines on the

sides and a single horizontal line at the base, the apexes being at the lip.

c) Stepped triangles composed of parallel vertical lines, with the apex at the lip.

d) Alternating sets of steps composed of parallel lines.

There is considerable variation in vessel form and some of these differences have temporal significance. Vertical-sided and outsloping carinated vessels are common in all periods. Globular-bodied, straight necked, wide-mouthed jars appear late. *Molcajetes* of black ware occur and show the usual change (discussed below under *molcajetes*).

4. *Polished red ware.* Temper is of medium size and the consistency is compact. Hardness is about 3.0–4.0. Surfaces are polished over a red slip or wash. Decoration is absent. Vessel forms are confined to vertical-sided, outsloping, or outflaring carinated vessels. A few vessels have tripod feet of the solid, low conical variety. This is one of the dominant wares in the early period and decreases steadily until in the final period it is almost non-existent.

5. *Engraved polished ware.* Temper is fine sand, and the paste is slightly porous. The hardness is about 4.0. The surfaces are polished and have an oak-brown color. Engraved designs are on the rims and are of five kinds:

a) Crosshatched triangles around the rim with the apexes at the lip.

b) Triangles filled with lines parallel to one side and usually having the other side composed of two or three parallel lines, with the base as a single line and the apex at the lip.

c) Triangles as mentioned above, with the areas between the triangles filled with crosshatching.

d) Designs of parallel zigzag lines.

e) Chevrons composed of four parallel lines.

The shapes are the same as those previously mentioned, with the addition of one shape rather difficult to determine. These vessels appear to be fat truncated cones with the mouths at the smaller ends. The polished wares, though occurring in all periods, reach their greatest frequency in the final period.

6. *Molcajetes.* This form has small temper and medium consistency. The hardness is about 3.5. The surfaces are smoothed or polished. Very rarely they are polished red or polished black. Incisions in the interior base of the bowl are of four varieties:

a) Incisions that radiate from the center like spokes.

b) Incisions that are concentric circles.

c) Incisions that divide the base into four quadrants, with parallel incisions in each quadrant that are at right angles to those in the adjoining quadrants.

d) Incisions very similar to (*c*) except that no lines divide the sets of parallel lines into quadrants.

Vessel forms vary in that in the early period hemispherical bowls predominate while in the late period recurved rim bowls are most frequent. The feet on these vessels also show considerable variation in that in the early period solid, low conical feet predominate; in the middle period small, solid nubbin feet are most common; while in the last period low, hollow conical feet are dominant.

FIGURINES

The figurines of this culture for the most part were found on the surface. Unfortunately only two were unearthed in excavation. The figurines consist of ten heads, of which nine are mold-made, and numerous hand-modeled body fragments.

1. A modeled head of undetermined type was associated with the ceramics of the early pottery period.

2. A mold-made, triangular-headed type was uncovered in an excavation of the late ceramic periods that resembles types found by Ekholm in Period IV and V levels.[9]

3. Four rectangular, mold-made heads lay on the surface. (Armillas stated that this type resembles heads prevalent in late Teotihuacan times.)

4. One large portrait type,[10] identical with those found in the Huasteca during Period IV, was discovered on the surface of one site.

5. A mold-made, jaguar-head effigy was found near the aforementioned head.

6. Two round, mold-made heads, having very indistinct facial characteristics, complete the list. I know of no comparable types in Mexico.

As to parts of bodies, all are hand modeled and reveal that the figures had collars and arm bands. A few legs indicate that at least some of them were seated, cross-legged figures.

To sum up the Pueblito culture, it may be divided into three periods that appear to correlate, on the basis of the figurines, with Huasteca III, IV, V. Of particular interest is the use of carinated vessels; the engraved pottery designs of inverted chevrons, composed of four lines, on polished black pottery; and zoned, brushed wares, all of which have been noted by Griffin and Kreiger[11] as similar to the Alto and Sanders ceramics of east Texas. The Pueblito culture will be more completely described in the final publication.

Now let us turn to the two culture complexes that have direct bearing on Mexico-Southeast relationships. The first, the Brownsville complex,[12] is located along the Gulf Coast, does not extend more than twenty miles inland, and is bounded on the south by the San Fernando River and extends to the north into Willacy County, Texas (Fig. 1, V). My conclusions about this culture are based upon eighty-two sites. Ten of these I discovered, fourteen were located from A. E. Anderson's data and resurveyed, and the findings of both were combined. Finally, the materials from fifty-eight

[9] Ekholm, 1944, p. 449, Fig. 5, *c*, *d*, *f*, *g*.

[10] Ekholm, 1944, p. 448, Fig. 4.

[11] See below, pp. 28 ff. *Editor.*

[12] Sayles, 1935, p. 40.

more sites were separated from the Anderson collection by means of the accompanying field notes.[13] Actually, materials from four hundred more sites are at the Laboratory of Anthropology, University of Texas. These materials were numbered, catalogued, and described by A. E. Anderson of Brownsville, Texas. The sites from which they were taken were numbered and their locations recorded as well. These sites were not analyzed due to the length of time necessary to separate the specimens from their groupings as type artifacts into the groups of artifacts found at the various sites. However, a cursory examination of these materials revealed little if any differences from the eighty-two sites I have analyzed.

The sites of the Brownsville culture are usually situated on small rises along waterways or extinct waterways and are characterized by an abundance of broken shell and burned clay remains of fire basins. The sites are small and, for the most part, are without any depth of deposit (less than 2 inches). Shell artifacts further characterize this culture. The most distinctive type is a projectile point made from a columella (the central portion of a conch shell). These points are round in cross section (½ inch thick), polished to a long tapering point (1 to 2 inches in length), and have a polished, beveled, squared base.

The second most common artifacts are chipped shell discs, varying in size from that of a dime to a half-dollar. Similar to these in size and shape are ground shell discs which are usually centrally pierced. Carved pendants of both mollusca and conch shell are found. These pendants often have geometric design of cross-hatching or straight lines, and occasionally no design at all. The shapes vary, those made of conch shell being either triangular or square, those of mollusca, rectangular, square, oval, or in their natural form. The piercings of the pendants also vary: The triangular ones have three holes along the base; the oval and rectangular have either one or two piercings at the extremities; the square ones are centrally pierced; and the whole mollusca shells have one hole on either side of their umbos. Four engraved shell pendants are worthy of special mention. Three of these have carved crosses; one cross is inside a circle. The fourth pendant, triangular in shape, is made of part of a large conch and decorated with a full-face view of a human head carved in relief. A roll, which appears to be a snake, frames the face, and arising from the head are two crossing incised lines which become wavy and fan in five or six small lines at their extremities. (These two lines may well represent an antler head-dress.) Hanging from the ears are two thick, round earrings.

Next in frequency are beads or tinklers of *Oliva* shells.[14] The bulbous ends of the *Oliva* shells are cut off, and near the pointed end opposite the opening, holes are drilled or notches are cut. There are cylindrical, polished conch columella beads or tubes, as well as cylindrical, polished columella plugs. Mussel shell scrapers are common, and columella ground to a point are present. Shell fish-hooks are occasionally found.

Bone artifacts are rare and consist of split bone awls and bone tubes, 3 to 4 inches long, decorated by one or more incised lines around the body.

The stone work consists of four types of artifacts:

1. Small humpbacked scrapers.
2. Chipped drills or pins.
3. Projectile points.
4. Hammerstones.

The scrapers are usually round and have a diameter no larger than that of a penny. One side is flat, the other, humped. Either one edge or the circumference leading to the flat surface appears to have secondary chipping. The utility of such a small implement is rather difficult to imagine. The chipped drills or pins are pointed at one end or both ends, and are usually between 1 and 2 inches long and less than ¼ inch in diameter. The hammerstones, for the most part, are mere pebbles. The projectile points seem to be of one type, having three variants. The most common points are triangular in form, with the base only slightly shorter than the sides. The base is definitely concave; the sides, a little less so. The points are from 1/16 to ¼ inch thick, from ½ to 1 inch long, with excellent chipping. The second variety is identical with the first except that the sides are slightly convex, and the chipping is less well done. The third variety differs in having all three sides slightly convex and very poor chipping.

Burials, when found, are generally placed

[13] The collection of A. E. Anderson has been loaned to the University of Texas by his surviving relatives.

[14] Ekholm, 1944, p. 480, Fig. 32.

apart from the camp sites, although some burials are in camp sites. The burials are predominantly flexed, and about half of the time are without burial furniture. When burial furniture does appear, it usually consists of beads, pendants, or Huasteca pottery.

The contacts of this group, as indicated by trade objects, are exceptionally wide and extremely important to the solutions of our problems. Mason[15] has described five pots, obtained by Anderson at Brownsville complex sites. These may be identified as Huasteca VI on the basis of information from Ekholm. I have about seventy sherds and pots, which, with the exception of the Zaquil Red sherds, may all be dated as either Huasteca V or VI, although the majority seem to belong to Period VI. These sherds consist of the following types: Huasteca Black-on-White, Tancol Polychrome, Tancol Brown-on-Buff (Period VI), and Las Flores Molcajete Fine Paste, Las Flores Red-on-Buff, and Las Flores Relief Ware (all Period V). Incidentally, no Period VI sherds were present in the same site with Period V sherds. Two jadeite objects have also turned up in Brownsville complex sites—one, a large spherical bead 1 inch in diameter; the other, a small celt-like object 1 inch long. These undoubtedly came from Mexico, and probably from the Huasteca, for although Ekholm discovered no such objects, Pavon informs me that they are seen in the Huasteca sites. This contact, moreover, does not seem to have been entirely from the Huasteca to the Brownsville people since the finding of the *Oliva* shell beads, the shell disc beads and discs, and the typical Brownsville variant 1 type of projectile point in Huasteca sites may indicate the reverse as well.[16] Some obsidian chips and points, also present, probably came from farther south in Mexico, or down the Rio Grande.

All the Brownsville contacts, however, were not with the Huasteca. The two dominant projectile point types of the partially contemporaneous Abasolo focus are seen in Brownsville sites, as well as underneath them, and Brownsville points occur in Abasolo sites. Significantly missing from the Brownsville sites are projectile point types from the Repelo complex and the often-associated Pecos River focus. Perhaps even more significant is the lack of trade objects from the coastal groups in the Corpus-Christi-Baffin Bay region of Texas; this will be discussed and an explanation attempted later. One projectile point of particular chronological significance was discovered: a Brownsville variant 1 point, made of green bottle glass. This may indicate an extension of the complex into historic times and contact with Europeans.

The trade objects most important to our problems are the points and drills that appear to have come from the north and thus indicate contacts in that direction. Six such points were found. One point, identified by Kelley as a Hutto Convex point, is small (1 inch long), convex-based, with a body that slopes straight from shoulder to the point, and side notches separating the base from the body. A second small point (1 inch long) with the shoulder almost as wide as the length, has convex sides, a concave base, and side notches. The point was classified by Kelley as being Keechi Concave. Keechi Concave and Hutto Convex, according to Kelley, occur together rather consistently in northeast central Texas sites that are protohistoric or late prehistoric. Another small point ($\frac{7}{8}$ inch long), having a triangular body with an expanding stem, was recognized by Krieger as Eddy Expanding Stem. It is made from a gray, translucent, granular flint that is very similar to the flint native to the Austin region, and from which many points of this Austin focus type were fashioned. Another type of concave based point is of a style found sporadically in north and central Texas, but dominant in eastern Texas and characteristic of the Titus focus. This point, about $1\frac{1}{4}$ inches long and $\frac{1}{2}$ inch wide, has a concave base, concave sides which are roughly parallel, and an abrupt convex point, very delicately chipped and very thin. It is made of flint differing from that of any other projectile points from Tamaulipas. Krieger identifies this point as Talco Triangular. A long (2 inches), narrow ($\frac{1}{2}$ inch) triangular point with serrated edges and a square base was recognized by Campbell of the University of Texas as a type usually found in late prehistoric sites between Victoria and Austin, Texas. The final two points are similar to ones found in central Texas. One resembles Keechi Concave, but has a narrower body ($\frac{1}{2}$ inch wide), while the other is like Hutto Convex but is longer ($1\frac{1}{2}$ inches long), and its shoulders are less well defined. Other trade objects indicative of northern contact are two drills. One is a small drill with a square base ($\frac{1}{2}$ by $\frac{1}{2}$ inch) and a short, pointed shaft, $\frac{1}{2}$ inch long and $\frac{1}{4}$ inch

[15] Mason, 1935, Fig. 21, 27, and 27 ff.

[16] See below, p. 9.

wide at its base. The other has an elliptical base, an inch wide, and a tapering shaft ¾ inch long. Such drills are unknown in Mexico, but have a wide distribution in Texas, north and east of the Balcones escarpment.

The time period of the Brownsville complex is relatively easy to determine. That it may have lasted until historic times in the Brownsville region is suggested by the finding of the projectile point of green bottle glass. Since I was able to examine materials from nearly 500 Brownsville sites and look over more than 3000 projectile points, it is, I believe, significant that no Langtry Stemmed points were found—all the more so, considering their frequency in Repelo sites and occurrence in Abasolo sites, since these two complexes are geographically farther from the probable Big Bend center of dispersal than the Brownsville focus. They are also absent in the Huasteca coastal camp sites, which are rather obviously contemporaneous with the Brownsville complex. Kelley dates the end of the use of Pecos River points at about 1000 A.D. The most plausible explanation, therefore, seems to be that the Brownsville complex and Huasteca V and VI (Mazapan-Aztec Mexican periods) did not go back to 1000 A.D. Stratigraphically in the Río Grande delta the Brownsville complex seems to have superseded the Abasolo complex, and later to have been contemporaneous with part of the Abasolo complex which was then located farther south.

The last culture identified in this survey of Tamaulipas was Huastecan. The Huasteca camp sites north of the Soto la Marina River (and those, reliable informants say, north of Punto Tordo) are situated along the coast in or adjacent to the Laguna Madre (Fig. 1, IV). These sites extend northward one mile past the San Fernando River (30 miles south of the Río Grande). All ten of the sites contain shell strata, varying in thickness from 1 inch to 3 feet. Fortunately (or unfortunately) wave action has eaten into all of these sites so that a cross-section can be observed and so that the surface collection made along the banks produced an adequate sample. One site was tested by a 5 by 15 foot trench, 4 feet deep; another by slicing the bank for about 6 inches and straightening it along a 10-foot profile.

Two of the sites contained sherds from both Huasteca V and Huasteca VI; the other eight contained only Huasteca VI sherds. Some of the sherds were identified by Ekholm as Zaquil Red, Heavy Plain, Panuco Grey, Las Flores Red-on-Buff, Las Flores Relief Ware, Las Flores Molcajete Fine Paste, Las Flores Molcajete Crude Paste, Tancol Polychrome, and Huasteca Brown-on-Buff. Unfortunately, none of the sherds which I identified as Huasteca Black-on-White were seen by Ekholm, but I believe my identification is correct. The sherds from the levels of my excavations and from the site on which the profile was made fall in rather closely with the sequences previously determined by Ekholm in the Tampico-Panuco region.

Seven sherds were discovered which, though they are similar to Huasteca sherds, cannot be definitely assigned to that group. All of them were in association with Huasteca VI pottery. One of the seven is certainly a trade sherd, and will be discussed later; the others I shall describe here. They are all characterized by fine line, engraved designs in bands on the outer rims of the vessels. The paste, consistency, color, and vertical outflaring rim of three of the sherds show similarity to the Tancol Brown-on-Buff, fine paste type. The fourth sherd is from a small, hemispherical bowl, but the paste is the same as that of the first three. The fifth is the rim of a vertical-sided vessel; the paste, temper, and white color with a black band encircling the outer rim attest its affinity to Huasteca Black-on-White, but its engraved decoration within the black painted zone is something not found in the Huasteca. The sixth—actually seventeen sherds—composes one-half of a flat-bottomed, convex-sided bowl with a small mouth only slightly larger than the base. The paste, temper, consistency, and decoration on the interior look like Tancol Polychrome, but the shape and the exterior engraved decoration are unknown in the Tampico-Panuco region. This engraved decoration on what are obviously Huasteca-made sherds, in light of the earlier engraved Pueblito sherds and the East Texas engraved pottery, hints at some interesting conjectures and formulations of new problems.

The one sherd that is definitely alien to the Huasteca is part of the neck of a vessel and an adjacent part of the body, which is at right angles to the neck. The paste is quite similar to Huasteca Black-on-White, but the decoration is not. The neck is painted black, and the body orange. According to Du Solier,[17] sherds of this kind occur at the Isla de Sacrificios in southern Vera Cruz.

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[17] See below, p. 24. *Editor.*

Also included in the Huasteca material is the hollow leg and adjacent part of the body (showing a hand) of what appears to be a small effigy vessel.

The stone complex of this culture consists of flake scrapers, part of a metate, two drills, and projectile points. The flake scrapers and the part of a metate need no description, and the two drills are so obviously aberrant that I shall discuss them later in the section concerning the outside contacts of the Huasteca camps. At all sites—with the notable exception of the excavated site at the mouth of the Soto la Marina River, where pottery from both the Huasteca V and VI periods was found—the most common projectile points are of that type diagnostic of the Brownsville complex (i.e., small triangular points). Second in frequency of occurrence are points called Type 4 by Ekholm.[18] These points are triangular, with straight bases and convex sides. They are slightly larger than the Brownsville types; and, although they are a little better made, are otherwise very similar to Abasolo points. Despite their great likeness to the Brownsville and Abasolo types, these kinds of points are not considered trade points, because of their abundance in the Huasteca materials. It is, of course, possible that they may have been originally derived from some outside culture.

Three projectile points in this collection, however, are considered trade points because of their rareness in Huasteca materials, their frequent appearance in relatively nearby cultures, the fact that a majority of the trade points found in Huasteca materials come from these same cultures, and finally, the fact that in at least one case, the flint used is foreign to Tamaulipas and common in the region in which the type of point is generally found. One of these specimens is a lower half of a projectile point, having a straight stem, beveled on both sides toward the base, and straight shoulders to the slightly convex edges of a rather long body. Kelley identified this point as closely resembling Nolan Beveled Stem, common in north central Texas in the Clear Fork focus. Glen Evans also noted that the flint used for this point is of the variety in the Abilene area, and quite different from any in Tamaulipas.[19] Incidentally, the associated types of the Clear Fork focus, Baird Bevelled Blade and Taylor Thinned Base, some made of the same flint, are intrusive into the Alto focus. The second point is small and narrow with a concave base and side notches just above the base. It is the Keechi Concave type of central Texas. The third point is small, thin, and delicately chipped. It has a concave, almost notched base and a body long in comparison to its width (1 inch to ½ inch), with concave edges that become convex just before the point. It looks like a type frequently found in north central and northeast Texas; on the other hand, it might conceivably be a modification of the Brownsville type 1 points.

One of the two drills is square-based and similar to the trade drills described in connection with the Brownsville complex.[20] The other is a unique flint drill, at present not known in other parts of Mexico. It resembles the winged drills found north of the Balcones escarpment in Texas, more often in the central than in the western part of the state. It has a well defined square base, with lateral, wing-shaped projections and a long, narrow, tapering drilling portion.

This concludes the factual and descriptive portion of this report. Now let us turn to a consideration of our problems and the ways in which this data may throw light on the solutions.

COMPARISONS

That there were contacts from north and central Texas into the region of northern coastal Tamaulipas, to the Brownsville complex (which was in intimate contact with the Huasteca) and to the Huasteca, is evidenced by the numerous trade projectile points in the Huasteca and Brownsville sites. The validity of calling these artifacts trade points is attested by their identity in form to those in central Texas, the fact that at least two of them are made of material from that region, and the complete lack of similarity between their form and that of other points in the sites or complexes in which they were found. There are some indications, moreover, that the contacts were not all one way.

During the First Symposium on the Caddoan Archaeological Area in 1946, Mrs. J. H. Ray exhibited a clay head from a site west of Cisco, Texas. Dr. Noguera immediately identified it as the Aztec god, Xipe-Totec.[21] In 1939, Carl Chelf discovered a greenstone head at the

[18] Ekholm, 1940.

[19] Glen Evans (Assistant Director, Texas Memorial Museum, Austin, Texas), personal communication.

[20] See above, pp. 7–8.

[21] Krieger, 1947*b*.

Grelle site in Travis County, Texas. (Trade points indicate this site to have been in contact with both the Alto and Clear Fork foci.) "According to Dr. George Vaillant and Dr. J. A. Mason, the material resembles porphyries used in the states of Puebla and Vera Cruz. They are also of the opinion that the appearance of the specimen suggests a southern Mexican origin, possibly Guerrero."[22] Another item of interest is a head, found in Dallas, Texas, carved from a hard cemented volcanic ash.[23] This carving certainly appears similar to ones in Mexico, particularly in the Huasteca. Krieger is preparing a paper upon a number of Mexican objects found in central Texas, some of them indisputably Huasteca.

A consideration of the foci of the Gibson aspect also tends to shed light upon the route of prehistoric contacts. Krieger has informed me that there appears to have been considerable contact between the Alto focus of central-east Texas and the cultures of central Texas, as well as with the Sanders focus. Further there is evidence that some of the foci of the Gibson aspect containing Mexican-like elements (such as the Spiro and Sanders foci) antedate the foci to the east which have similar elements (such as Moundville and Etowah) and, therefore, these Mexican-like elements in the Southeast may have passed from west to east. The evidence for this statement is six-fold.

1. In a Sanders focus grave there was a trade bowl identified as Monks Mound Red Ware.[24] Ford and Willey have indicated that the Old Village materials of Cahokia (Monks Mound Red Ware included) antedate the Moundville materials.[25] Therefore, Sanders probably antedates Moundville.

2. In early Middle Spiro, there are loop-handled, shell tempered jars.[26] These appear to be trade objects from the Central Mississippi Valley. In the Central Mississippi

TABLE 1. A PROPOSED SEQUENCE OF CULTURE IN TAMAULIPAS CORRELATED WITH ADJACENT AREAS

Valley of Mexico	*Tampico-Panuco*	*Sierra de Tamaulipas*	*Inland Tamaulipas*	*Coastal Tamaulipas*	*Rio Grande Delta*	*East Texas*
		Los Angeles complex	↑		↑	↑
Nahua-Mixteca	Huasteca VI			Huasteca VI		Fulton aspect
					Brownsville complex	
Tula-Mazapan	Huasteca V			Huasteca V		Spiro focus
		Late Pueblito	Abasolo complex		Abasolo complex	Alto focus
Late Teotihuacan	Huasteca IV	Middle Pueblito				
Early Teotihuacan	Huasteca III	Early Pueblito				
			Repelo complex			
			↓			
Cuicuilco-Ticoman	Huasteca II	Diablo complex				
		↓				
Early Zacatenco	Huasteca I					

[22] Carl Chelf, 1941.

[23] *Bulletin of the Texas Archeological and Paleontological Society*, Vol. 3, p. 79, Abilene, 1931.

[24] Krieger, 1946.

[25] Ford and Willey, 1940.

[26] This is not indicated in Orr's paper in AMERICAN ANTIQUITY (Orr, 1946), but was called to my attention at the Caddoan Conference by James B. Griffin.

Valley this type is predominantly earlier than the "Cult" material.

3. A study made of trade sherds at Kincaid indicates that Moundville sherds arrived there later than a Plaquemine sherd. The Spiro materials have been shown to be contemporaneous with Coles Creek,[27] which in turn is earlier than Plaquemine.

4. If Krieger's date for Spiro-Sanders-Haley, that these cultures are pre-1450,[28] is correct, then the intrusive Moundville sherds at Kincaid, dated by dendrochronology, are considerably later.

5. Orr stated at the Caddo conference, 1946, that copper work is absent during the beginning of the "Cult" at Spiro and appears only occasionally during the later period of the cult. Therefore, since copper work is abundant at Etowah and Moundville, this may indicate that the "Cult" arrived there later.

6. Orr has stated that the Spiro focus has more "Cult" elements than are found to the east. Using an age-area hypothesis, it may be that Spiro is older and the center of dispersal in the Southeast.[29]

Thus, I believe we may state that a chain of contacts existed from the Huasteca in Mexico to the late temple-mound builders having the "Cult" east of the Mississippi. The first link of the chain would be the Huasteca of Vera Cruz, San Luis Potosí, and the northern Tamaulipas coast. This link is well evinced by the common ceramic tradition. The second link is between the Huasteca and the central Texas cultures (and an east Texas culture, if the Talco Triangular point is identified correctly), as attested by the central Texas trade points in Huasteca sites (and in Brownsville sites with Huasteca pottery) as well as by the Huasteca objects found in central Texas sites. The third link is between the central Texas cultures and the Alto focus, based on the points of the Clear Fork focus and the Round Rock focus found at the Davis site, a component of the Alto focus. The connections of the Alto focus with the Sanders and Spiro foci is indicated by the fact that sufficient traits are held in common to place all in the Gibson aspect. The connection of Spiro with more eastern culture is based upon the fact that fifty-one ceremonial traits are held in common between Spiro and Etowah and Moundville. In conclusion, one might say that individuals having Huasteca ceremonial concepts (to be listed later) could have moved along this link of contacts: the Huasteca, the Tamaulipas coast, central Texas, and east Texas.

Concerning other routes, J. A. Mason and others have presented considerable evidence negating them. (This makes the route described above seem even more likely.) Though this material has been described at length elsewhere, I shall briefly reiterate. Theoretically four other routes are possible: from Mexico to the Southwest to the Southeast; from Mexico via the Antilles to the Southeast; from Mexico along the Gulf Coast to the Southeast; and, finally a route directly over water from Mexico to the Southeast, traveled either by Mexican Indians in their own boats or Indians carried on a Spanish expedition.[30] The Mexico-Southwest-Southeast route is negated by the facts that the majority of the Mexican elements in the Southeast are not found in the Southwest, and that the few contacts that have been found between the latter two regions are all too late to have been responsible for the Mexican elements in the Southeast. Concerning the Antillean route, it suffices to say that Antillean materials have not been found in Florida, nor many Mexican elements in the Antilles. The Gulf route faces two serious difficulties: first, east of Baffin Bay, Texas, no Mexican objects have been found; and second, artifacts of the cultures east of Baffin Bay have been rarely found in the adjacent Brownsville complex and in the Huasteca camps.[31] The hypothesis of a direct water route traveled by Indian boats is without evidence, and is weakened by the poor quality of the Mexican coastal Indians' boats (the Maya excepted);[32] while the proposal that the contact with the Southeast might have been established by Mexican Indians brought into the region by the Spaniards, is disproved by Krieger's pre-Columbian dates for the Spiro and Sanders foci.[33] Thus both the positive and negative evidence points to the likelihood of the coastal-Tamaulipas—central-Texas—Southeast route.

[27] Orr, 1946. Actually, it was pointed out at the Caddoan Conference that early Spiro materials, as indicated by the association with Weeden-Island-like materials, are contemporaneous with early Coles Creek, not late Coles Creek.

[28] Krieger, 1947*b*, Fig. 50, p. 143.

[29] Orr, personal communication.

[30] Griffin, 1943.

[31] This curious lack of trade between two almost adjacent cultures may be explained by ecological factors, for between Cameron County, Texas, and Baffin Bay, there is a desert 100 miles long with few, if any, natural sources of fresh water. All early explorers skirted this region, and archaeological sites here are rare.

[32] Mason, 1935.

[33] Krieger, 1947*b*.

The time of the use of this route is indicated by the periods of the Huasteca sherds in the Tamaulipas coastal sites and by the complete absence of any associated Pecos River points. The absence of Pecos River points suggests a post-1000 A.D. date for these movements. The Huasteca sherds, if we accept the Goodman-Thompson calendar correlation and Ekholm's correlation of Huasteca Period V with Tula-Mazapan and Huasteca VI with Aztec, give us a date from 900 to 1600 A.D. Furthermore, our Huasteca sherds show that, while the movements, evinced by Huasteca camp sites on the Tamaulipas coast, started in Period V, they increased greatly in Period VI. This seems to agree with the picture in the Southeast of a few Mexican-like elements entering early, such as truncated pyramids in the Alto and Troyville foci; then a markedly significant increase of Mexican-like elements in the Spiro, Sanders, and other sites. There was, incidentally, no evidence found along this route for the often postulated early set of influences from Mexico which supposedly brought pottery, corn, burial mounds, and presumably associated traits.

The above two conclusions concerning the route and time of contacts seem to be backed by concrete evidence; the next two conclusions are more in the speculative realm, and are only suggested by the survey. In fact, much of the proof for them must lie outside the area of Tamaulipas.

The findings of the survey certainly seem to point to the Huasteca as the source of Middle American influences in the Southeast. Their camp sites are distributed northward along the coast considerably beyond their main habitat, and they were in contact with the central Texas groups. The final solution of the problem of the source, however, lies primarily in indicating comparatively that a certain group in Mexico had a preponderant majority of the adequately determined Mexican ceremonial-artistic concepts found in the Southeastern cultures. Since this survey points to the Huasteca as the source in question, let me list the similarities in the cultures of the Southeast to the Huasteca of Periods V and VI. This list is in no way final, and its validity as a solution to the problem must await comparisons of other Mexican cultures with the Southeast as well as further investigation of the Huasteca.

GENERAL TRAITS

1. Truncated pyramids constructed of earth and often rebuilt.
2. Arrangement of pyramids around a plaza.
3. Effigy pipes.[34]
4. Effigy vessels.[35]
5. Columella pendants.
6. Round shell gorgets.
7. Uni-lobed tripod bottles.[36]
8. Hafted celt.[37]

HUASTECA TRAITS SIMILAR TO THE "CULT" MATERIAL OF THE SOUTHEAST

Motifs

1. Greek cross.[38]
2. Swastika (or rolling cross).[39]
3. Sun circle (scalloped circles)[40]
4. Bi-lobed arrow.[41]
5. Death motif—the skull with scalloped occipital region.[42]
6. Death motif—the crossed long bones, associated with the skull.[43]

Position of the Human Figure or Figures

1. Running or dancing figures.[44]
2. Fighting figures.[45]
3. Kneeling figures.[46]

Costume of Figures

1. Occipital hair knot.[47]
2. Plumes on head.[48]
3. Antler head dress.[49]

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[34] Ekholm, 1944, p. 475; Phillips, 1940.

[35] Ekholm, 1944; Phillips, 1940.

[36] Meade, 1940, Láminas 54 and 55; Waring and Holder, 1945, Fig. III, *k*.

[37] Beyer, 1933, Fig. 2; Waring and Holder, 1945, Fig. II, *f–k*.

[38] Du Solier has drawings of painting at Tamuin to be published shortly; Waring and Holder, 1945, Fig. I, No. I.

[39] Beyer, 1933, Fig. 24; Waring and Holder, Fig. II, No. I and II.

[40] Du Solier, painting at Tamuin (see human figure 11 in this series); Waring and Holder, 1945, Fig. II.

[41] Beyer, 1933 (if Beyer's interpretation is correct, that the Aztec god Mixcoatl [Chichimecatl] was originally Huasteca, then the bilobed arrow carried in the hand [see Fig. 17] may be considered as a Huasteca trait); Waring and Holder, 1945, Figs. II, III.

[42] Beyer, 1933, Pl. II; Waring and Holder, Figs. I, VIII, *a*.

[43] Du Solier, personal communication; Waring and Holder, Figs. I, VIII.

[44] Beyer, 1933, Pl. VIII; Waring and Holder, 1945, Fig. V, *a*.

[45] Beyer, 1933, Pl. VIII; Waring and Holder, 1945, Fig. V, *e*.

[46] Beyer, 1933, Pl. VI; Waring and Holder, 1945, Fig. V, *f*.

[47] Beyer, 1933, Fig. 2; Waring and Holder, 1945, Fig. V, *h*.

[48] Beyer, 1933, Pl. 1; Waring and Holder, 1945, Fig. V, *g*.

[49] Du Solier, painting from Tamuin; Waring and Holder, 1945, p. 15.

4. Ear spool with tassel.[50]
5. Beads or bands on arms and legs.[51]
6. Necklaces with columella pendants.[52]
7. Beaded belts.[53]
8. Baton held in hand.[54]
9. Head held in hand.[55]
10. Beaded forelock.[56]

Complex of Elements

1. Dancing figure with plumed head dress, tasseled ear plugs, and one outstretched hand holding a human head by the hair while the other hand is upraised and holding a baton.[57]

RESEMBLANCES BETWEEN THE HUASTECA AND CULTURES OF THE CADDO AREA

1. Elbow pipes with a flange at the base of the bowl (also found in Titus focus, Texas).[58]
2. Platform pipes with a tube stem and a centrally located bowl.[59]
3. Snake held in hand of figure.[60]
4. Round-ended baton with cross inside round portion of baton.[61]
5. Feathered eye.[62]
6. Scroll eye.[63]
7. Spherical beads of stone.[64]
8. Conical cap on head of figures.[65]
9. Use of carinated vessel form.[66]
10. Engraved decorations on polished pottery.[67]
11. Mask or paint covering the lower portion of the face.[68]
12. Carved faces on shell gorget, in relief, with a roll or snake over the head.[69]
13. Location of piercings on round shell gorgets.[70]
14. Vertically entwined serpents.[71]
15. Speech scrolls.[72]

The above list of forty-two items indicates that the Huasteca must for the present be considered a very possible source of Mexican-like ceremonial concepts manifested in art and artifact that have been found at the late prehistoric sites of the Southeast (such as Spiro, Etowah, and Moundville).

The final problem is concerned with the type of contact. The ultimate answer to this problem will be determined outside of Tamaulipas. However, if my conclusions are correct concerning the more or less familiar route and time, and the Huasteca as a possible source, and if we assume that all Huastec Indians at all sites had the same religious-symbolic concepts, then something can be said about the possible types of contact. In the light of this survey, two kinds seem feasible: either the contacts were of an indirect nature, or they were made by small groups of Huastecs moving along a known route. The central Texas projectile points in both the Huasteca camps and in the Alto focus, as well as the Huasteca sherds and central Texas projectile points in the Brownsville complex, speak strongly for indirect contacts between the Southeast and the Mexican groups. The second possibility is indicated by the distribution of the Huasteca camps along the coast, far north (over 200 miles) of the concentration of the Huasteca around Tampico. These northern camps do not appear to represent migrations or expansion of the Huasteca culture, since none are present in the fertile valleys of the Río de las Palmas, the Río Soto La Marina and the Río San Fernando, but instead are located around the Laguna Madre, where the surrounding alkaline soil, impossible for agriculture, would have meant a terrific up-

[50] Beyer, 1933, Fig. 37; Waring and Holder, 1945, Fig. V, *a*.

[51] Beyer, 1933, Fig. 3; Waring and Holder, 1945, Fig. V, *i*.

[52] *Ibid*.

[53] Beyer, 1933, Fig. 44; Waring and Holder, 1945, Fig. V, *a*.

[54] Beyer, 1933, Pl. VI, and Du Solier; Waring and Holder, 1945, Fig. V, *a* or *c*.

[55] Du Solier, painting at Tamuin (in human figure 9); Waring and Holder, Fig. V, *a* or *c*.

[56] Du Solier, painting at Tamuin (on head of fourth human figure); Waring and Holder, 1945, Fig. V.

[57] Du Solier; painting from Tamuin; Waring and Holder, Fig. V, *a* or *c*.

[58] Ekholm, 1940, p. 475; Krieger, 1946 (see Titus focus).

[59] Reported by Du Solier in the Huasteca region of San Luis Potosí, 1946; Burnett and Clements, 1945, Pl. III.

[60] Beyer, 1933, Pl. VIII; Burnett and Clements, 1945, Pl. XXXIII.

[61] Du Solier, painting at Tamuin; Spiro collection, University of Oklahoma.

[62] *Ibid*.

[63] *Ibid*.

[64] Ekholm, 1944, p. 488; Spiro collection, University of Oklahoma.

[65] Beyer, 1933, p. 173; Spiro collection, University of Oklahoma.

[66] Krieger, 1946.

[67] See below pp. 28 ff. *Editor*.

[68] Beyer, 1933, Fig. 2; Burnett and Clements, 1945, Pl. XXX.

[69] Anderson collection, University of Texas; Burnett and Clements, 1945, Pl. LIX.

[70] Beyer, 1933, Pl. VII; slide shown by Dr. Orr at Caddo Conference, 1946.

[71] Beyer, 1933; Burnett and Clements, 1945, Pl. XXVIII.

[72] Du Solier painting at Tamuin; Burnett and Clements, 1945, Pl. XLII.

heaval in their economic organization. That they were bases of Huasteca traders seems most likely in light of the large amount of trade indicated with the Brownsville complex, and in light of the trade objects in these camps from a number of other cultures. If this was their function, and if this trading went on for some time, it does not seem unlikely that individuals or small groups of Huasteca occasionally crossed into east Texas via the route indicated by the trade projectile points. One incentive to such excursions would have been the fact that the east Texan cultures had a good deal more to trade, such as blankets, copper, tobacco, pipes, etc., than the simpler coastal and central Texas cultures. Another kind of incentive for the transference of ceremonial concepts has been suggested by Bennett, namely, that the cultures in the Southeast had attained a social complexity and a ceremonial orientation that allowed for ready acceptance of the more complex Mexican "religious-symbolic" concepts.[73]

SUMMARY AND FURTHER PROBLEMS

It appears that contacts probably were made from Mexico along the Tamaulipas coast into central and north central Texas, and finally into east Texas and the rest of the Southeast. These contacts probably started around 1000 A.D. and reached their culmination two or three hundred years later. Most likely the donors of many ceremonial concepts integrated into the culture of the Southeast were the Huastec Indians, whose influence reached the groups in the Southeast either indirectly, or by means of small groups of Huastecs.

The validity of the above statements could be further tested by the program outlined below.

1. The route.
   - *a*) Archaeological activity in central Texas.
   - *b*) Excavation of more of the northern coastal Huasteca sites.
   - *c*) Investigation of the southern Tamaulipas.
   - *d*) Survey from Valles northward along the eastern slopes of the Sierra Madre.
   - *e*) Further investigations in the Huasteca proper.
2. The time.
   - *a*) Excavation of one large Repelo-Abasolo site having Pecos River points and Huasteca sherds.
   - *b*) Thorough investigation from Reynosa to the Big Bend area.
3. The group.
   - *a*) Full analysis of the Mexican-like materials in the Southeast.
   - *b*) Full analysis of Mexican materials in light of the materials from the Southeast.
4. The type of contact.
   - *a*) Careful consideration of the ethnohistory of Tamaulipas and central Texas.
   - *b*) A social anthropological consideration of the "Cult" materials.

[73] Bennett, 1944.

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University of Michigan
Ann Arbor, Michigan
December, 1946

THE ARCHAEOLOGICAL ZONE OF BUENA VISTA, HUAXCAMA, SAN LUIS POTOSÍ, MEXICO

WILFRIDO DU SOLIER, ALEX D. KRIEGER, AND JAMES B. GRIFFIN

FOREWORD

DURING the field season of 1941–42, joint excavations were undertaken in the Huasteca territory by the American Museum of Natural History and the Instituto Nacional de Antropología e Historia.[1] The American Museum had appointed Dr. Gordon Ekholm to investigate this area as a part of the program sponsored by the Institute of Andean Research. The Instituto Nacional appointed Wilfrido Du Solier to collaborate with Ekholm because of his (Du Solier's) long interest in and knowledge of the area.

It was decided to undertake work in the following sites: Las Flores in Tampico; Tancol, a little to the north of Tampico; Panuco, on the river of the same name; and Buena Vista, Huaxcama, San Luis Potosí, to the northwest of the Huasteca territory. The explorations in Buena Vista and Las Flores were made by both Ekholm and Du Solier, while those of Panuco and Tancol, due to the illness of Du Solier, were made only by Ekholm. Because of this, it was decided that Du Solier would study Buena Vista and Las Flores, and Ekholm, Panuco and Tancol.

Only the material from Buena Vista will be presented in this paper because of the special interest it has with regard to relationships to the north and because it complements certain phases of the recent field work of MacNeish in Tamaulipas.[2] The report of the site, the classification of the pottery, and the relations with the cultures of Mexico have been prepared by Du Solier,[3] while the relations with the southeastern United States have been prepared by Griffin, Krieger, and Du Solier.

THE AUTHORS

REPORT ON BUENA VISTA

Introduction

One of my principal aims in studying the prehispanic culture of the Huasteca has been to

[1] Ekholm, 1944.

[2] Reported in the previous article of this issue. *Editor.*

[3] The Spanish manuscript of Du Solier has been translated by Griffin, assisted by Richard S. and June MacNeish, and by Adrian F. Leon y Marquez.

find data concerning the relationships of that group with the other cultures which flourished in Mexico. Also, I wished to investigate the possibilities that the Huasteca originated in the Mississippi Valley, or else immigrated toward the southeastern United States.

The excavations previously undertaken in the territory of the Huasteca have supplied us with abundant material for understanding the high type of culture achieved in this area and have made it possible to refer to cultural connections between the Huasteca and the south of Mexico. Unfortunately, however, they have not enabled us to determine comparable relationships to the north of Mexico, i.e., with the southeastern United States.

Few points of relationship or common ideas between Mexican cultures and those to the north of the Rio Grande have been established. They include features of theocratic ideology, certain similarities between breast plates of shell, and some artistic concepts of the Mixteca-Puebla culture during the period after the founding of historic Tula of the Toltecs in the state of Hidalgo.

In this paper are presented additional points of contact between the Huasteca area and the Caddoan cultures of Texas and Oklahoma.

Description of the Zone

The archaeological zone of Buena Vista is one of the most northwesterly points explored in the territory which could have been occupied by the prehistoric Huasteca culture. It is located approximately between the parallels 100° 28′ west longitude and 22° 32′ north latitude. It lies 70 kilometers due east of the city of San Luis Potosí.

The land on which the structures are built is calcareous and has very little vegetation and running water. The inhabitants have to resort to dams and reservoirs in order to obtain rain water. The vegetation is almost exclusively mesquite and cactus. This low region is encircled with a series of small lakes which often degenerate into swamps.

The mounds are scattered about with no apparent regularity, appearing solely to form a small central square surrounded by mounds of varying heights and dimensions. The majority are circular at the base (Fig. 2). On the surface of the ground a great quantity of potsherds can be seen and future stratigraphic pits will undoubtedly produce evidence for ceramic differences during the occupation of the site.

Structures

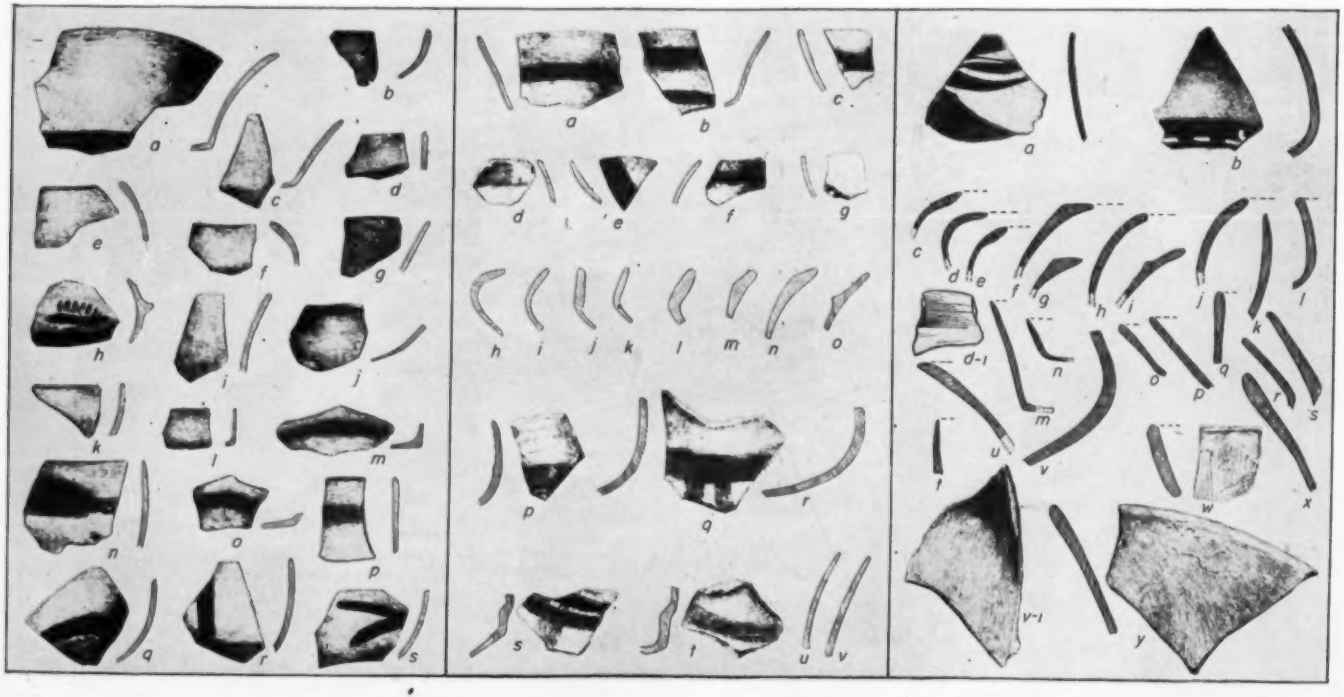
Although the study of the Huasteca mound at Buena Vista has already been published separately,[4] it is necessary to give a brief description of the edifices which provided the pottery types presented in this paper, with, of course, additional information regarding the provenience of this pottery. The first structure explored was provisionally designated by the letter *A*, and is a circular structure built with sandstone slabs set with clay, arranged in the form of a circular enclosure without any visible entrance (Fig. 2). The slabs are aligned more or less regularly.

The stone slabs seem to have been shaped on one surface so that the exterior view of the enclosure presents a partial homogeneity, and the same occurs in the interior face of the wall, since it was built of a double ring of stones (Fig. 2). This fact supports the idea that the structure was used as an enclosure, though its dimensions make it difficult to believe that it had a roof made from the material available at the time. During the course of the explorations, remains of wood were found, but it was not determined whether these remains were from a ceiling or from a wall of wood that had been fixed in the circular stone structure.

Whether this structure served as a habitation or as a substructure of a building, is not certain from our work, nor could it be determined that it was a tomb, if such a name can be applied to a place which serves to shelter the mortal remains of man. The structure had no entrance, which makes it difficult to believe that it was used as a habitation. There are two reasons against considering it a substructure: first, the interior face of the wall is half-hewn; and second, the wall, outside as well as inside, is perpendicular and therefore does not present as much resistance against thrust as if it were sloped, as are the majority of the Huasteca constructions used as supports.

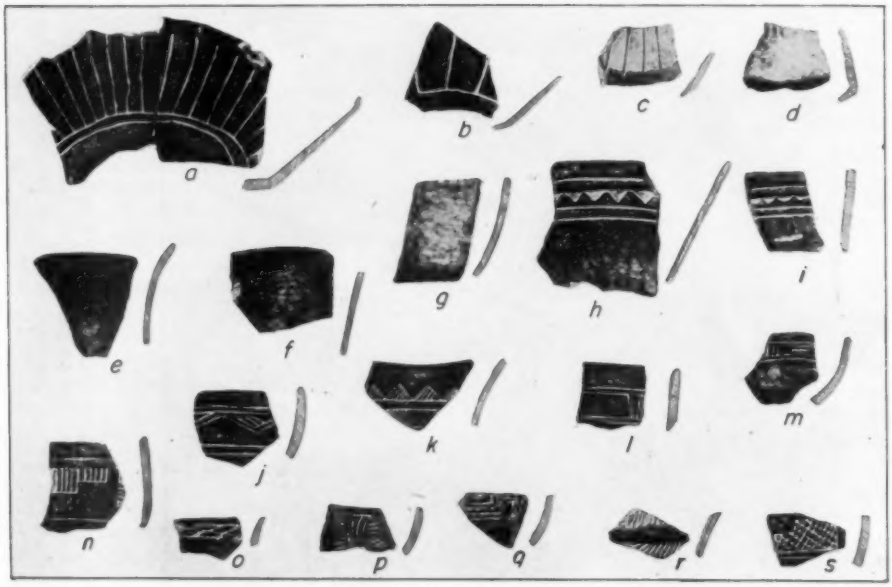
The second structure explored has been designated *B*, and is quite large, having a rectangular base, two of whose sides are considerably longer than the others (Fig. 2). Access to the upper part was by means of eight stairs, of which we have excavated three, two of them almost completely destroyed. The profile of this structure can be seen in the illustration. The orientation of the two long sides is roughly north-south.

[4] Du Solier, 1945*b*.

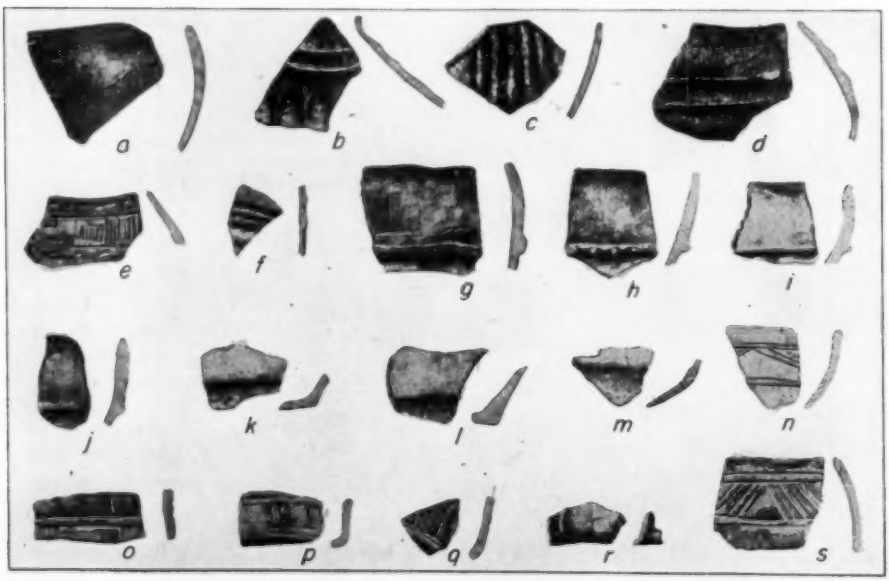


A B C

Pottery from Buena Vista, Huaxcama, San Luis Potosí, Mexico. A, Bay-red ware: *a–k*, red on both sides; *l*, red inside, bay outside; *m*, bay inside and outside with red decoration; *n–s*, red inside, bay outside, with red bands on the bay. B, Bay-red ware: *a–f*, bay inside and out, with red decoration; *p*, *q*, *u*, *v*, bay ollas with red stripes; *s*, *t*, ollas with double grooved necks. C, Miscellaneous pottery: *a*, *b*, bay ollas with red stripes; *c–e*, large red bowls; *f–i*, bay cups; *j–l*, *s*, bay ollas without painted decoration; *m–q*, *t*, *u*, *x*, coarse utility pottery, undecorated; *v*, *w*, *y*, coarse utility pottery with lined decoration.



A



B

Pottery from Buena Vista, Huaxcama, San Luis Potosí, Mexico. A, Greyish-black ware: *a–c* and *h–s*, engraved or incised; *d–g*, plain. B, Greyish-black ware: *a–d*, *f*, *r*, grooved; *e*, *n–q*, *s*, engraved or incised; *g–m*, with basal angle.

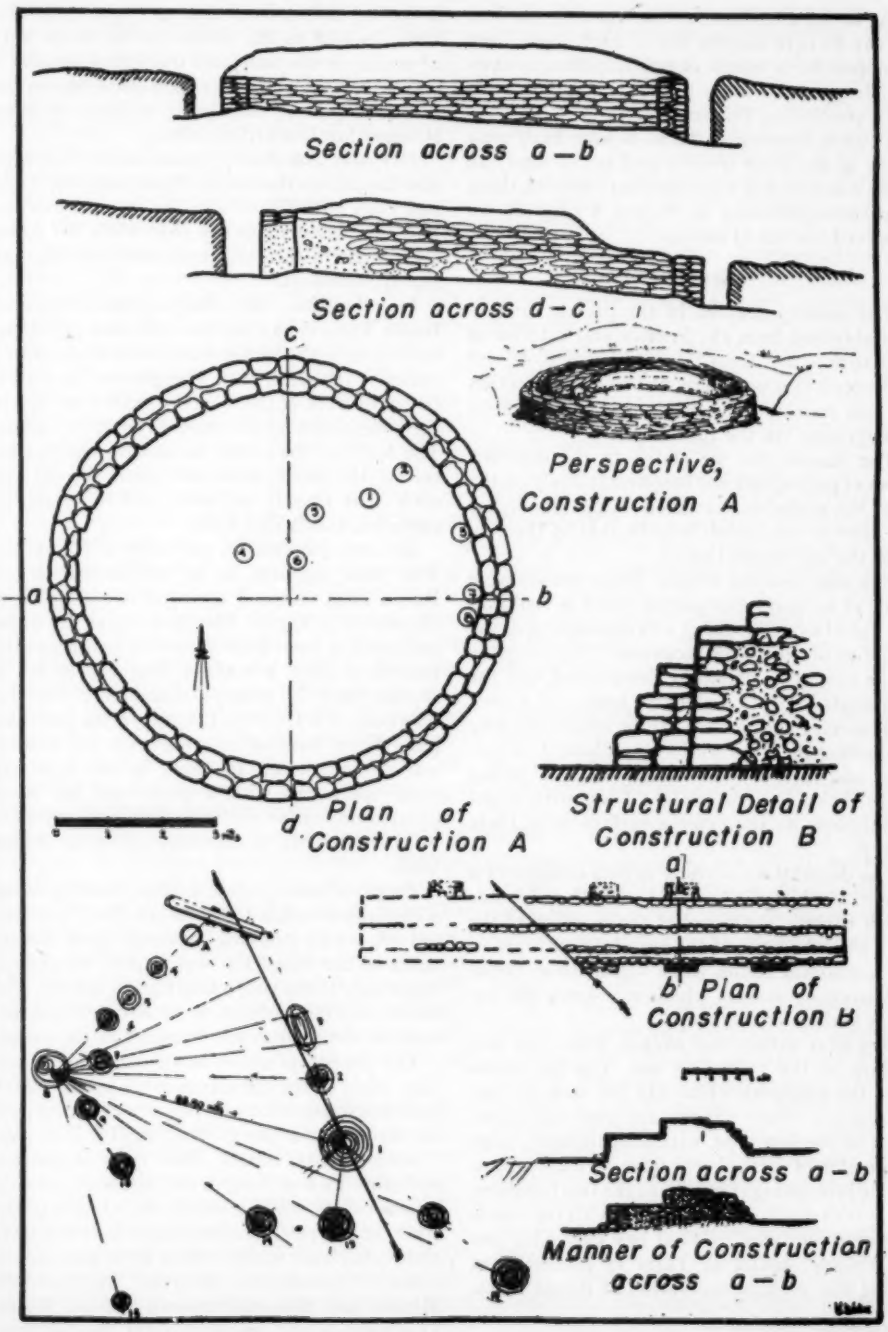


FIG 2. Ground plans and cross sections of the Buena Vista site.

As to the use of such a construction, the best we can do is to suggest that it might have been a support for a temple or public edifice, or even a gallery to view some spectacle.

In concluding this section, we wish to state that while structures *A* and *B* were built with stone of the same quality and set in mud, no trace was found of a plaster coat covering these structures, although in Mound 8 (Fig. 2) we observed the use of stucco.

Ceramics

The pottery studied in the present section was obtained from the interior and exterior of structure *A* and from the exterior of *B*. It will be treated as a unit here, but in a later section we will endeavor to distinguish an "artificial stratigraphy" in the rubble of *A*.

The names that we assign to the different types of pottery are not based exclusively on the clay, but rather on the exterior appearance, for the color of the vessels may be that of the clay or of the slip applied to it.

Bay ollas with red stripes. These vessels were made of red clay with temper which is visible to the naked eye. The firing was incomplete in the majority of the sherds recovered. The complete shape cannot be definitely determined, but the fragments indicate a globular body and a neck with several variants, as can be appreciated by comparing the cross sections on Plates I, B, *q*, *r*, *u*, *v*; and I, C, *b*. Some examples have flaring necks; some have a straight body with slight undulations on the exterior surface as in Plate I, B, *p*.

The decorations of these vessels consists of a yellowish-white slip bearing brownish-red bands which encircle the vessel at the junction of the neck with the body of the vessel. In addition to the horizontal bands, some vessels have radial and irregular stripes which run down the exterior surface of the body.

Bay ollas without red stripes. This type is a variant of the preceding one. The specimens have the yellowish-white slip but lack the red decoration. Their shapes are also similar to those of the first type, with a significantly high proportion of vertical neck forms (Pl. I, C, *j-l*, *s*).

The interesting thing about the two foregoing types is that the ollas decorated with red bands resemble the type "ollas of bay clay with two red stripes" found at Tajin in central Vera Cruz.[5] The style of decoration at Buena Vista, however, differs from that at Tajin. The first type, as well as the second, seems to be very abundant in the zone, and if our stratigraphy is correct, this pottery was used more during the early occupation, later being replaced by other stronger but less artistic ollas.

Bay ollas with double-grooved necks. This type also has connections with the ceramics of Tajin and even with Cholula in the state of Puebla; but it is pertinent to say that while the forms are similar in the three localities, the clay and slip are different.

In coloration, the double-grooved type of Buena Vista is like the two previous types, occurring in both the decorated and undecorated varieties (Pl. I, B, *s*, *t*). The grooves which encircle the neck of the ollas are shallower than in the comparable types from Tajin and Cholula. The body of the vessel is smooth and has received the same yellowish-white slip as the neck. The clay is red with visible tempering particles, and is well fired.

Bay cups [tecomates, according to Du Solier]. This type appears to be indigenous to the Buena Vista area and varies only in shape from the previous types. The form is, as its name indicates, a bowl [cajete] whose borders curve inward in such a manner that the orifice is smaller than the greatest diameter of the vessel's body (Pl. I, C, *f-i*). The upper rim generally has a bevel forming an angle with the interior wall of the vessel. Included in this type are some specimens with a peripheral red band painted on the beveled rim. The type seems to be characteristic of the older period at Buena Vista.

Large red bowls [cajetes]. Here, the clay is red with temper visible to the naked eye. There is a red slip which probably covered all of the interior of the vessel but was applied on the exterior only to the rim, which curves inward. The lower exterior surfaces were not polished because of the utilitarian character of the vessel.

The shapes of these bowls are limited and vary solely in the curvature of the rim. Some of them might be called cups [tecomates] because of the strong incurving of the rim (Pl. I, C, *c-e*).

Grayish-black vessels. This type of pottery undoubtedly has the greatest interest, not only because of its superior quality in relation to the other local types but also because it is this style and its variants which enable us to postulate a ceramic connection between northeastern Mexico and the southeastern United States. This type is also significant for the relation-

[5] Du Solier, 1939*a*, 1945*a*.

ships it shows with other zones of Mexico, making it possible to place the culture of Buena Vista in a more or less exact period.

Because of their particular interest, we will discuss separately the variations of this pottery, describing now only the group that has no decoration but merely the identifying color. It is regarded as pottery of probably a reddish clay, but the action of the carbon in the smoke and the imperfect firing produced the black color. It is believed that the black color was obtained in the same manner as in the black pottery of Teotihuacan and Tajin in central Mexico, and also it might be said, of Panuco and El Prisco in the Huasteca. The carbonaceous smoke produced in firing was allowed to penetrate the surface, and the latter was then polished to perfection. This rather elementary technique did not produce vessels of a uniform color; they are very black in some areas and greyish-brown in others. Hence, the ware is called grayish-black. For shapes, the reader is referred to Plate II, A, *d-g*.

Although the pottery is quite fragmentary, we can say that the most common shape was a bowl with a flat base and outcurving sides. Small ollas can also be identified from their rim sherds, which are large and outcurving. Other fragments indicate the presence of bowls of compound silhouette and small ollas whose body walls form an angle on the side of the vessel.

Grayish-black vessels, engraved or incised. This was the most abundant decorated type and includes the vessels with the most elaborate decoration, where there seems to have been a special interest in attaining beautiful designs. We are including in this division the incised decoration made before the firing of the vessel, when the clay was still plastic; incision made when the clay was dry; and, finally, those specimens on which the decoration was made after the vessel had been fired, which is called engraving. Sometimes this latter decoration was further embellished by rubbing red paint into the engraved lines.

The designs can readily be divided into four groups, a division which we base not on technique but on style. The first group comprises those designs which consist of two grooved, parallel lines extending horizontally around the upper rim of the vessel, leaving a small horizontal band between the lip and the lines. Immediately below these two lines are geometrical figures which often form triangles; these are either striated or plain (Pls. II, A, *h, j;* II, B, *n, s*). There are also parallel lines alternating with smooth spaces that seem to form S's (Pls. II, A, *n;* II, B, *e*). Another form of decoration does not have a regular form, but is simply engraved in order to interrupt the monotony of a smooth band (Pl. II, A, *l, m*). All these designs are bordered on the lower side by one or two parallel horizontal lines that also encircle the vessel.

The designs of the second group have been placed immediately below a simple incised line that encircles the rim of the bowl. It appears that the motifs in this case range from simple irregular lines to others which have symbolic significance (Pl. II, A, *o, p*).

In the third group are included sherds whose designs consist of small hachured triangles placed above two horizontal lines. Below the lines are also found the S-shaped motif of the first group (Pl. II, A, *k*).

The fourth group contains all the sherds without rims. In these, there is great decorative diversity (Pls. II, A, *a-c, r, s;* II, B, *o, q*).

As to the clay, it is in all respects similar to that of the plain grayish-black pottery, and we can say the same of the firing. With regard to shape, there seems to have been more variety, the bowls differing in almost all cases. Also, the cup [tecomate] appears to be present (Pl. II, B, *e*).

Greyish-black vessels, grooved (corrugated). This is another decorated form of the simple grayish-black pottery, resembling the latter in clay, polish, and firing. Its salient characteristic is the presence of horizontal (Pl. II, B, *a, d, f*) or vertical (Pl. II, B, *c*) grooves, and in some cases of a combination of the two (Pl. II, B, *b, o*). The grooves are generally rather shallow, and they could well have their origin in the imitation of natural life forms such as the squash (gourd) so common in the Huastecan and Tarascan cultures.

The polish of these vessels is very fine, either because greater care was taken in their manufacture or on account of better raw material. Some of the vessels are obviously of a brownish color, but only fragments of these vessels were found, and it may well be that they represent the portion which received only a thin slip and naturally could acquire only a medium tone.

Greyish-black vessels with basal angle. There was little variability in the shapes of these vessels, as they were limited to bowls with sides gently curving inward, almost forming cups [tecomate]. The vessels consisted of two parts, base and body, the body being so intimately

linked with the neck that the one is no more than an uninterrupted continuation of the other.

Between the bottom and the body a flange was made, generally as a part of the wall of the vessel. Nevertheless, we recovered some fragments indicating that this peripheral flange had been applied separately after the vessel had been constructed (Pl. II, B, *g*, *h*). In the first case, or those in which the peripheral ring was built into the wall of the vessel, the flanges formed a true edge (Pl. II, B, *i*, *j*).

The clay is similar to that of the plain, greyish-black pottery, as are the polish and firing, although the temper is coarser than in the previous types.

Vessels red on both sides. This pottery, whose slip ranges from red to orange, was manufactured from a red clay, perfectly fired, without visible temper. This allowed the production of strong, thin-walled elegantly shaped vessels. The most common forms are flat-bottomed bowls with outcurving sides, hemispherical bowls, and cups with small lugs of clay pinched from the vessel walls (Pl. I, A, *a-k*).

Vessels red inside and bay outside, or red outside and bay inside. These two are incorporated in the same type; to separate them would complicate instead of simplify the classification. Whether inside or out, the clay and red slip are in all respects alike and, as was the case with the vessels red on both sides, the slip ranges in color from red to orange. The clay and shapes also seem to be like those of the previous type, with the addition of a vertical-walled bowl with a flat base (Pl. I, A, *e*).

Vessels red inside and bay outside, with red bands on the bay surfaces. This type also resembles the previous ones in clay, firing, and shape. But the idea of a contrasting deçoration, particularly with the red and bay colors, brings to memory the classic Tula-Mazapan pottery, which we have already found represented, although with better defined characteristics, in the northeastern part of the Huasteca and, more exactly, during Period V at Panuco and in the pottery of Las Flores in Tampico (Pl. I, A, *n-s*).

Vessels bay inside and out, with red decoration. This sub-type is similar in clay, form, and firing to the above, but has a higher percentage of decoration. We discuss it separately because later studies may perhaps indicate that the difference between the two styles is chronologically significant (Pls. I, A, *m;* I, B, *a-f*).

Black-red pottery. Few sherds of this type were found. The red color appears on the exterior and the black, on the interior. As to forms, these could not be determined, for the few small pieces that we found indicated only that the red-black sherds of Buena Vista show some analogies to the pottery of the same name also found by me at Tajin.[6]

Yellow vessels, undecorated. This name refers to the slip to be found on the outer surfaces of these specimens. Both the inner and outer surfaces were first painted white, and then a yellow slip was added to the outer surfaces, a technique which recalls the Cholultecan pottery that Noguera called "lacquered." Even though the two techniques are similar, the Cholula paint adheres more poorly than the Buena Vista paint. The forms are flat-bottomed bowls with outflaring walls, and small ollas with flaring rims. The clay is of excellent quality, without visible temper, and perfectly fired (Pl. III, A, *b*, *d-k*).

Yellow vessels with negative decoration. In clay, firing, form, and slip these specimens are identical with the ones discussed above. In addition, they are decorated by the lost-wax or negative process of painting (Pl. III, A, *c*).

Engraved orange vessels. We found only a few fragmentary examples of this type at Buena Vista, which is unfortunate on account of the relationships which the type reveals, as explained below. The specimens consist of small sherds of hemispherical bowls.

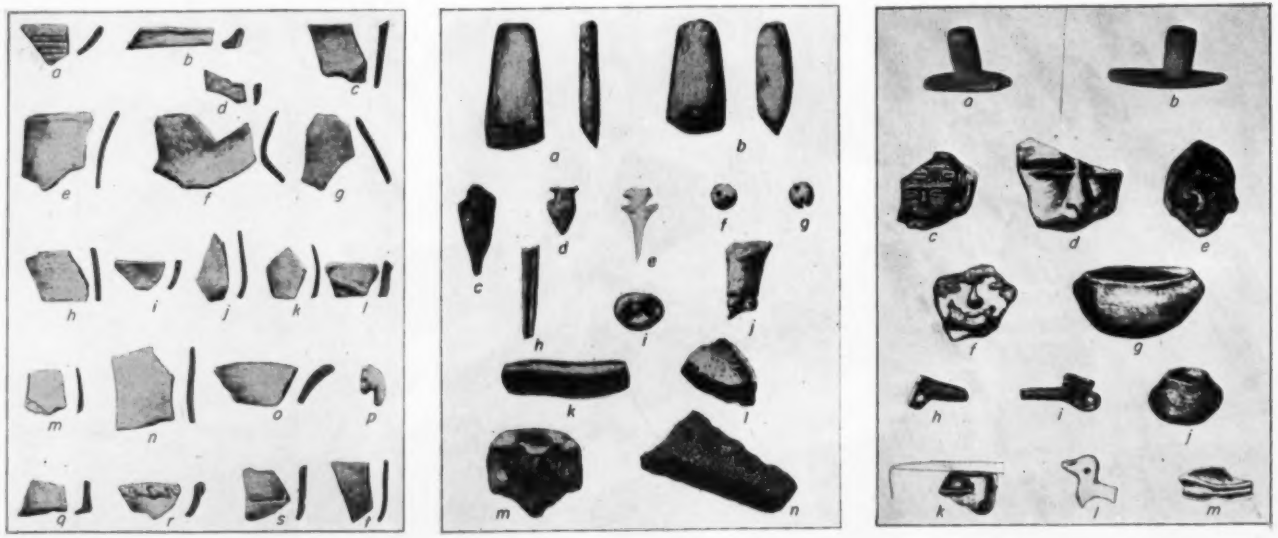
This pottery is named orange for the color of its clay; either it did not receive a slip or the slip has been eroded. The decoration, made when the clay was plastic, consists of geometrical motifs incised very lightly (Pl. III, A, *a*).

White-red pottery. Very few types are as difficult to locate as this one. It may be considered sort of a "ceramic globetrotter," whose culture and provenience cannot be determined so far. Examples have been found in zones far removed from one another, but always in such small percentages as to bar any attempt to ascertain the origin of the type.

In the present case only one sherd was found, whose shape might have been that of a hemispherical bowl. The clay is of excellent quality, with perfect firing, the slip having been applied to the exterior and the red coloration to the interior (Pl. III, A, *m*).

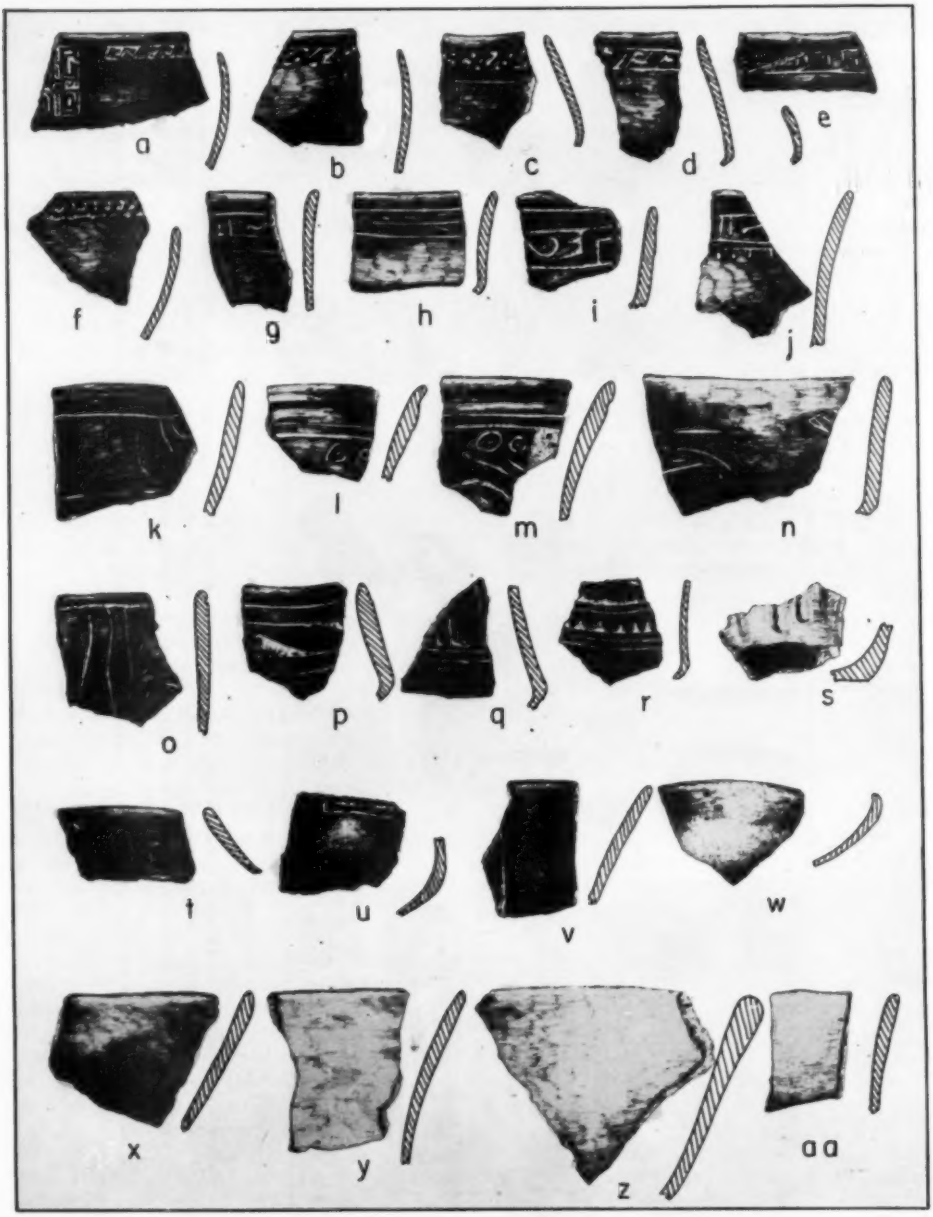
Lacquered pottery. These potsherds have been

[6] Du Solier, 1945*a*.



A B C

Artifacts from various sites, San Luis Potosí, Mexico. A, Pottery from Buena Vista: *a*, engraved orange ware; *b*, *d–k*, yellow ware, undecorated; *c*, yellow ware with negative decoration; *m*, white-red ware. B, Implements from Buena Vista: *a–b*, stone axes; *c–e*, arrow points; *f*, *g*, clay head in the form of a rattle; *h*, bone awl fragment; *i*, snail *ehecacozcatl*; *j*, fragment of a bone awl of the *omechicahuastli* type; *k*, polishing stone; *l*, *n*, metate fragments of volcanic stone; *m*, small mortar of volcanic stone. C, Miscellaneous objects: *a*, *b*, platform pipes from Cuecillos; *c*, *d*, figurine heads of clay from Buena Vista; *e*, figurine head of clay from Toneanhuitz; *f*, figurine head of clay from Tamposaque; *g*, *j*, complete vessels from Buena Vista; *h*, *i*, clay pipe fragments from Buena Vista; *k–m*, anthropomorphic vessel fragments of greyish-black ware from Buena Vista.



Zaquil Black Incised pottery from the Panuco area, Vera Cruz, Mexico.

treated by a process similar to the yellow ones. Because of the very bad condition of their interior, it was impossible to ascertain whether they were originally polychrome or not; only a white background with red and orange spots can be perceived. The outside is generally orange-yellow. Due to the smallness of the fragments, their shapes cannot be determined.

Coarse utilitarian vessels, undecorated. As the name indicates, no special care was taken in the manufacture of these vessels, beyond that of a utilitarian character, but the exterior was polished with some care, resulting in the elimination of water seepage as far as possible. Therefore, these vessels might have been used to contain liquids.

Coarse pottery with red slip. The function of these pieces is difficult to determine. While the clay and firing suggest utility pottery, the presence of decoration implies a special usage. In addition to these specimens, there are a series of sherds which have lost their original appear-

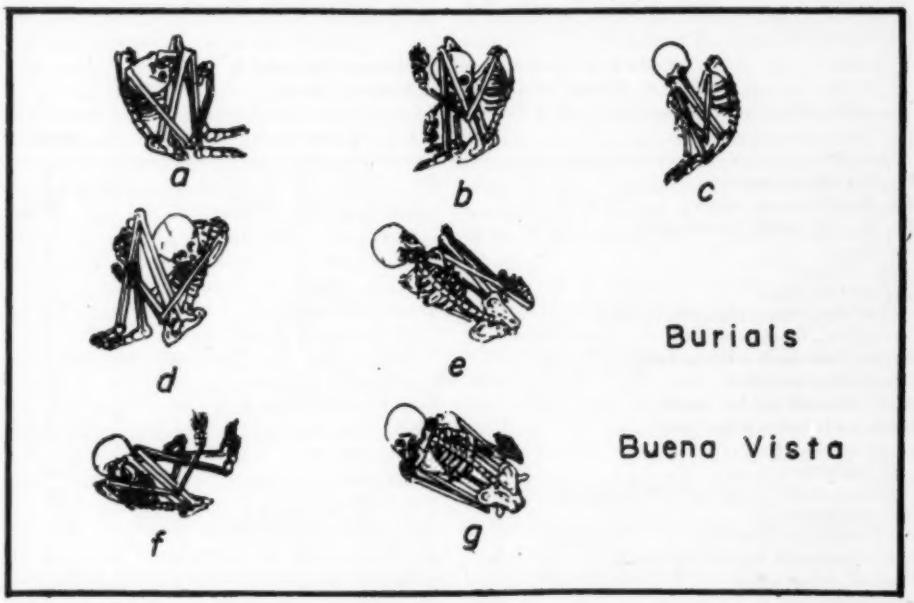


FIG. 3. Burial positions of seven skeletons.

necessary for its use. The clay is strong; the firing is imperfect; there is visible temper with, possibly, traces of mica. The outer surfaces have been smoothed and both the outer and inner surfaces of some sherds are polished. The shapes are those of big bowls or ollas with outflaring rims (Pl. I, C, *m-q*, *t*, *u*, *x*).

Coarse utilitarian vessels with lined decoration. The exteriors of these sherds show that, either by chance or deliberately, the tools used in their manufacture streaked the surfaces, like brushes, while the clay was still plastic. The forms, clay, and firing seem to have been similar to those of the previous type (Pl. I, C, *v*, *w*, *y*).

Coarse, polished pottery. This pottery is also ance in the course of time, the identifiable features including only the clay or traces of polish or color.

Other Artifacts

Because of the scarcity of implements of stone and bone, we are discussing both under the same heading. We recovered two stone axes, one of them being more like an adze (Pl. III, B, *a*, *b*). Also, we obtained a small mortar (Pl. III, B, *m*), two metate fragments, better called "huilanches" because they do not have legs (Pl. III, B, *l*, *n*), and one finely grained polisher (Pl. III, B, *k*), all of volcanic stone. There were three arrow points made of red stone, whose

forms can be seen on Plate III, B, *c-e*.

Only two bone artifacts were discovered. The first (Pl. III, B, *h*) is indubitably a fragment of an awl (graver); the second (Pl. III, B, *j*) is another fragment of an awl of the type known as *omechicahuastli*.

In ending this section, we will mention the presence of clay figurines (Pl. III, C, *c*, *d*), pipes (Pl. III, C, *h*, *i*), and a head in the form of a rattle (Pl. III, B, *f*, *g*).

Burials

Since this report deals principally with the pottery and we have already made a general study of the system of burials in the Huastecas,[7] we will limit ourselves to a brief description of eight burials discovered by Ekholm and us. All eight were found in the interior of structure *A*, were in a flexed position, and lacked offerings (Fig. 3). Arrow points occurred beneath one of the skeletons, but these may well have been part of the debris that filled the interior of structure *A*. The study of the crania did not offer any details that would serve to identify the ethnic type; thus we had to rely on the pottery to identify the culture that pertained to the burials in question. The depth of the burials varied between 20 and 40 centimeters; their orientations may be observed in Figure 3.

[7] Du Solier, 1946*a*.

Comparisons

We will now analyze the various types of Buena Vista pottery and will endeavor to identify them if possible with similar types in other parts of the Huasteca region and with those of different cultures. In so doing, we will make use of the distribution of the specimens according to level which is shown in Table 2.[8]

We begin with an analysis of the bay ollas with red stripes. This type is important not

[8] We include the table in this section of comparisons because we consider that it has more interest here than in the previous section. At the same time, mention will be made of the few whole vessels and artifacts of clay found in the zone of Buena Vista.

TABLE 2. POTTERY FROM THE INTERIOR OF STRUCTURE A, BUENA VISTA, HUAXCAMA, SAN LUIS POTOSÍ

	Level 1	*Level 2*	*Level 3*	*General*
Bay ollas with red stripes	2	7	65	7
Bay ollas without red stripes		17	33	20
Bay ollas with double grooved necks		1		
Bay cups			3	6
Large red bowls			4	
Greyish-black vessels	18	36	79	33
Greyish-black vessels, engraved or incised	2	9	22	9
Greyish black vessels, grooved		2	4	6
Greyish black vessels with basal angle			3	2
Vessels red on both sides	10	3	25	30
Vessels red inside and bay outside	1	1	14	27
Vessels red outside and bay inside			7	4
Vessels red inside and bay outside, with red bands on the bay surface	2		20	22
Vessels bay inside and out, with red decoration				34
Black-red pottery	2			
Yellow vessels, undecorated		11	22	1
Yellow vessels with negative decoration	1	1	4	1
Engraved orange vessels	1		1	
White-red pottery	1			
Lacquered pottery	3	3	8	1
Coarse utilitarian vessels, undecorated	76	14	93	267
Coarse utilitarian vessels with lined decoration	37	4	95	122
Coarse, polished pottery	34	9	58	363
Coarse pottery with red slip	4	1	18	1

only as one of the commonest forms in the zone, but also because it offers direct analogies in all points of form and decoration with the Tajin pottery of the same name. The clay employed at Buena Vista is native to the region. Thus we may consider the two types to be the product of influence rather than of trade, as would have been the case if the Buena Vista vessels had been made from a clay similar to Tajin.

If the differentiation of structure *A* into three levels is chronologically significant, it indicates that the bay ollas with red stripes are early, because the greatest number of examples were found in the deepest levels (Table 2).

The pottery without red decoration has a similar distribution, indicating it to be an ancient product of the region. We can also add that this type seems to be native to Buena Vista because it has not been found to date in Tajin, or in any other part of Mexico.

As for the bay ollas with double-grooved rims, we have already indicated in the descriptive section that there is a strong resemblance in form, clay, and coloration to similar pottery from Tajin and Cholula. This resemblance must signify either a common idea or a common culture in the three places.

The large red bowls seem to have connections only in the north of the Huasteca. Thus, we will see that Ekholm finds this type in his Period IV at Panuco, although the dimensions of the Panuco bowls are smaller than at Buena Vista. Both at Las Flores and Tampico, Ekholm and I were able to identify similar types that probably represent the ancestors of the Buena Vista type. I have also found them with certain characteristic variations in an archaic period at El Ebano in San Luis Potosí.

Of all the types found in Buena Vista, we can without hesitation say the grayish-black is the most important, for it is found in different parts of Mexico, apparently as a part of diverse cultures. In discussing this type we will refer also to the variants that were described above—the vessels decorated with engraving or incising, those with grooves, and we can even include two fragments of anthropomorphic vessels made of a clay colored black (Pl. III, c, *k*, *m*).

The black pottery without decoration cannot be very rigidly compared with other forms, as it does not have a very characteristic silhouette. We will only point out that this pottery is characteristic of the Teotihuacan culture, principally during Periods II and III, and that similar types are encountered in Tajin, where they are contemporaneous with Teotihuacan. As we have indicated elsewhere,[9] this type may be the result of rather late influence from Teotihuacan.

The engraved or incised black pottery has its most direct Mexican connections with the pottery of the same type in Tajin, and also in some respects with the pottery of Period IV that Ekholm calls "Zaquil Black Incised" (Pl. IV) and which, in his work on Panuco, he considers contemporaneous with Teotihuacan.[10]

We were very surprised to find that the greyish-black, grooved pottery is present in Teotihuacan I, an exceedingly ancient epoch, and that it might have lasted until Period II.

The basal angle type, which we have also included in the greyish-black group, may have been inspired by the pottery which Noguera includes in the orange pottery group with the following words: "A peculiar detail of this type, even though it sporadically occurs in those of brown-colored sherds, is that of having a series of incision-like notches on the angle formed between the rim and the body of the vessel. . . . this detail is peculiar to the vessels of the archaic period of Ticoman and Zacatenco, and it is likewise found in Tarascan specimens."[11] This does not of course mean that our Buena Vista sherds must have originated at Teotihuacan; we are merely pointing to the similarity of ideas. Panuco is another site in which vessels and cups with precisely this basal angle have been found, among the pottery of Ekholm's Period IV which he calls "Zaquil Red."[12] This Panuco type may well have been more closely connected with ours of Buena Vista.

The two sherds shown on Plate III, c, *k*, *m* seem to have analogies with anthropomorphic vessels of the classic Huasteca Black-on-White pottery, for which, unfortunately, we do not as yet have sufficient data to establish a chronology to determine its exact origin.

Although it may seem absurd to continue reiterating connections between Buena Vista and Tajin, the pottery painted red on both sides again parallels that of Tajin; the coloration and the slip are the same in both, the thicknesses of the vessels are also alike, and many of the forms are similar. Only the clay differs; although it is very fine in Buena Vista, its quality is even better at Tajin.

[9] Du Solier, 1945*a*.

[10] Ekholm, 1944.

[11] Noguera, 1935*a*, p. 20.

[12] Ekholm, 1944.

Pottery related to the orange-red ware of Buena Vista seems to be characteristic of the Huasteca region and in general of the cultures that flourished the length of the Gulf of Mexico. Itemizing sites, this type is found to the west of Buena Vista, at a place called Tamuin in San Luis Potosí, and even further toward the coast at Tamos; northwardly we found similar pottery as far as Tula, Tamaulipas; to the south the most distant point where I have seen it is at Medellin, Vera Cruz; in addition, Juan Valenzuela seems to have found some, although with slight modifications, at "Los Tuxtlas." It is still premature to determine the period to which this pottery belongs; at Tajin, the same type first appears in the deep layers and continues until the last period.

The pottery red inside, bay outside, and vice versa, has its closest connection with Tajin pottery, which it resembles in the colors employed, although the forms are different. At Tajin, it is one of the most ancient types, corresponding to Teotihuacan II and III.

The bay and red-bay pottery, in which the bay face is decorated with red, could be a reflection of the Tula-Mazapan complex. However, our Buena Vista type seems to be earlier than that of Tula, inducing us, in this case, to accept it as the ancestor of the Mazapan or Toltecan pottery.

The black-red type seems to be foreign to the locality, and could have been brought from a region such as Tajin where it is more characteristic.

We find a parallel in technique and coloration to the yellow pottery in Cholula, even though the shapes are different there. We have correlated several types which existed in Tajin with the orange pottery, because the interior had this color. In view of the discoveries at Buena Vista, however, they could more easily be incorporated in this yellow type on account of its form and color. In any case, the yellow pottery seems to be more characteristic of Buena Vista than of Tajin. We cannot consider it as a florescence of Cholula, for its appearance in Buena Vista seems to be characteristic of the oldest period.

If, in addition to the age of the yellow pottery, we note that it is decorated by negative painting, we must accept it as belonging to an older period than the lacquered pottery of Cholula. We are inclined to consider it contemporaneous with the negative-decorated pottery of Tajin.

The engraved orange pottery is undoubtedly a type of Tajin. Both there and at Buena Vista it is a recent product.

Little remains for us to add to what has been said about the white-red pottery, except that the sites where this type has appeared are Los Tuxtlas, Tres Zapotes, Isla de Sacrificios, and Tajin. It is most characteristic of the latter.

Very little can be said of the type that we call lacquered, as the sherds are extremely deteriorated. We find no better comparison than the Mixteca-Puebla lacquered pottery.

A major analysis of the utilitarian pottery is omitted, as it is more or less common to all of our Mexican cultures.

As for bone artifacts, awls of this material are found from the archaic cultures to the most recent periods of the Nahuas. Therefore, these finds do not provide us with any characteristics for chronological placement. Fragments of *omichicahuaztli* have also been found in different sites and as implements of different cultures, but they seem to be rather characteristic of middle and modern cultures (in archaeological terms).

Of the small clay bells, little can be noted besides the characteristics that the *omichicahuaztli* also present. However, we understand that they were quite common among the Mixteca. The pipes in Plate III, c, *h*, *i* are indubitably of a late period on account of their peculiar form.

Although we ourselves did not find pipes of the platform type, we were shown various stone pipes of this form in the private collection of Lic. Don Primo Feliciano-Velasquez from a region near Buena Vista called Cuecillos (Pl. III, c, *a*, *b*). Others were found not very far to the north in the archaeological zone of Guadalcazar, in which Ekholm and I encountered surface pottery like that of Buena Vista.

Conclusions

This section is divided into two parts, the first of which embodies the conclusions stemming logically from the relationships of the Buena Vista archaeological finds to the cultures of the rest of Mexico and the second endeavors to present conclusions based on a comparison of the Buena Vista complex with the cultures of the southeastern United States.

Owing to the fact that it was not possible to distinguish "natural stratigraphy" at Buena Vista, some of our conclusions will have to be stated tentatively. Nevertheless, the typologi-

cal study of both the pottery and other minor items, such as the architectural characteristics of the structures and the system of burials, give the conclusions more definitive status.

If the stratigraphy for structure *A* is accepted, two more or less definite phases can be segregated, probably corresponding to two different epochs. The older one is marked by the pottery type that we have named yellow, for the latter is not found either on the surface of this area nor in the first level of the "artificial" stratigraphy in structure *A*. Although different in shape, this type presents a certain analogy to the pottery of Cholulteca I in technique and coloration.

One other type seems to belong solely to the old period: the grooved, grayish-black pottery. The characteristics of this type are not distinctive enough to give a clear indication as to its contemporaneity or connection with other Mexican cultures. On the other hand, as we have stated above, it was not found either on the surface or in the upper levels of structure *A*, and therefore we are somewhat inclined to believe that it represented an ancient variety whose forms and techniques might possibly have been superseded by the other grayish-black pottery types—the smooth and the incised or scraped ones, although these two are found in greater abundance in deeper strata than in the recent levels. Both the smooth and the scraped or incised grayish-black pottery (the latter being contemporaneous with the yellow type), seem to have rather intimate parallels with Tajin II pottery.[13]

The black pottery with a basal edge is a variety that, in the Meso-American region, is generally rather old but reappears, after a very prolonged absence, in the archaeologically recent cultures. As discussed below, we believe that its contacts lie with the similar vases from the southeastern United States.

The pottery red inside and bay outside, with red on the bay surfaces, also appears in the oldest period, lapses during intermediate times, and reappears, on a smaller scale, in the last period. This leads us to believe that the people inhabiting the Buena Vista archaeological zone first produced the type very abundantly, then largely replaced it with a different one, and finally returned to it again.

To ascribe the red-on-bay pottery to a definite culture constitutes a difficult task. Although found at Tajin only in an ancient period, it seems that this pottery went through three stages which were widely distributed in Mexico. During the first of these, the red and bay colors were used in nearly equal proportions, that is to say that the area of the red surface is more or less equivalent to that of the bay, as it is found on some of the oldest Monte Alban vases, on those of the archaic culture of the Valley of Mexico, and even in the oldest periods of Tarascan pottery. In the second stage, the red decoration is very irregularly applied; in some cases it may possibly correspond to Teotihuacan III. The third and more characteristic stage is that in which the vases generally have a bay base, on which the red decoration is added by means of red lines, with designs that are perfectly delineated and somewhat geometrical in character. This stage includes the Coyotlatelco pottery.[14] Almost parallel to this pottery, and probably a derivative of it, is the pottery widely known under the name of Mazapan, similar in its decoration to that of Coyotlateco but showing an inferior polish and having motifs less geometrically arranged, limited almost to thin parallel lines and very often undulating ones.[15]

To assign our Buena Vista pottery to any of these three general stages is a difficult matter, for it seems rather to be a regional complex. Nevertheless if we must try to do it, we would be rather inclined to ascribe it to the latest period, contemporaneous, therefore, with the Tula Toltec epoch in Hidalgo. In brief, Buena Vista's oldest stage might be placed between Teotihuacan IV and the Mazapan pottery of Tula, fluctuating thus between the dates 900 and 1200 A.D.

Buena Vista's last stage might then be tentatively placed between the years of 1200 and 1350. To arrive at these last dates, we rely on the presence, although limited, of the orange incised pottery which is very abundant in the last period on the Isla de Sacrificios in southern Vera Cruz and likewise in the last period at Tajin in central Vera Cruz.

Were we to assign a culture to the makers of this Buena Vista pottery, we would have to rely not solely on the ceramics, but also on the data provided by architecture and minor items. The Buena Vista architecture must be ascribed to the Huastec culture, on account of its building system, the materials used for construction, and the shape of the buildings themselves.

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[13] Du Solier, 1945*a*.

[14] Tozzer, 1921, pp. 51–3; Noguera, 1935*a*, pp. 15–53.

[15] Linne, 1934.

With reference to the pottery, excepting certain types such as the yellow and the lacquer vessels, and those red inside, bay outside with red-on-bay decoration, all the others are abundantly found in the Huastec region. Even if some of these types apparently present some influences from central Mexican cultures, the influences are hardly strong enough to postulate that the people who created Buena Vista pottery came from central Mexico; rather, we should say that the Buena Vista inhabitants were Huastecs who had, somewhere, somehow, experienced a certain contact with central Mexican peoples and cultures, and undoubtedly with those of the southeastern United States.

As to other artifacts, such as bone objects, arrow points, "metates," etc., these also seem to be a product of the Huastec people with influences rather from the north than from the south of Buena Vista.

The second part of these conclusions consists merely of some observations of my own, reached independently from those of Dr. James B. Griffin and Alex Krieger while at the First Symposium on the Caddoan Archaeological Area at the University of Oklahoma during September, 1946.

In the course of these discussions I had the opportunity to examine the ceramic contributions of Orr, Krieger, Webb, MacNeish, Baerreis, and Newkumet, shown at the lectures, and I could then discern the existence of relationship between two southeastern United States cultures, Caddoan and Spiro, and the northeastern region of Mexico, with special reference to the Huastec area.

These observations were made after the completion of my study of the Buena Vista pottery, and therefore are not included with my main comparisons. As I intend to make a detailed analysis of the cultures of southeastern United States and northeastern Mexico, I want merely to present here some preliminary observations.

The relationships observed between the Caddoan and Huastec cultures are listed herewith:

1. Black vases, well polished, with incised decoration, sometimes scraped, and with red pigmentation in the incisions, are found in the Caddoan culture, at Buena Vista, and in Panuco IV (of the Huasteca). These vessels differ somewhat in shape from place to place, and in the last area seem to have lacked red pigmentation, as noted above.

2. Black pottery with scraped decoration, consisting of a red checkered pigmentation, is found both at Buena Vista and in the Caddoan and Spiro cultures. One of its decorative motifs, a succession of S-like shapes, is very common both in Caddo area and at Panuco IV, and is likewise found on the fresco murals of Tamuin in San Luis Potosí, and in the Huastec area.[16]

3. Zoomorphic vases, mainly in the shape of frogs, occur in the central Mississippi Valley; at Tampico, where they are rather abundant; and at the Isla de Sacrificios in the southern portion of the state of Vera Cruz.

4. Negative painting is found at several points in the southeastern United States as well as in Mexico. In the Caddoan area, it seems to be merely on trade specimens; from the central Mississippi Valley; on the other hand, decoration with the lost wax technique is common in northeastern Mexico, having been found at Panuco, Buena Vista, and Tajin. This technique constitutes a highly significant trait, because it is seemingly a characteristic of the older Mexican cultures. Its unquestioned persistence has been ascertained only up to the Tula-Mazapan period; a very few later specimens have been recovered, but there is considerable doubt as to the actual presence of the technique on these pieces.

5. Vases with an outflaring edge, circumscribing them, were found by Mrs. Hodges in the Caddoan area of Arkansas. The same ornamental motif is also present on Buena Vista pottery. In the majority of the Meso-American vases, this element seems to be early; it is found at Monte Alban I and II; at Ebano, San Luis Potosí; at Panuco II; in the Chicanel period of Uaxactun; and at other sites.

6. Vases from the Fourche Maline complex of southeast Oklahoma, which have scraped decoration on their upper parts in the form of hatched triangles, are likewise characteristic of Buena Vista pottery, are found in Panuco IV and V, and are very abundant at Tajin among the ollas with a double circular groove and those with red bands.

7. Cross-shaped ornamental motifs are found on Caddoan pottery and shell pectorals; on the black Panuco IV pottery; on the black Tajin pottery found by us; on the shell pectorals of Las Flores, Tampico; on the earplugs of the personages of the Tamuin frescos; and, lastly, on the bases of Ekholm's Period VI pottery, painted black-on-beige, and in the vessels of the same decoration found at Tampico.

8. Clay pipes with conical bowls and small frontal handles are found at Buena Vista and in four late foci of the Caddoan area: Mid-Ouachita (Cahinnio), Texarkana, Titus, and Belcher. In the Titus focus there are also clay pipes with conical bowls and with two small protruding legs, similar to the ones found in the last period at Las Flores, Tampico.

9. "Platform" stone pipes, so characteristic of the Spiro culture, have been found at Guadalcazar near Buena Vista in Huaxcama.

10. Another custom which was apparently common to both regions is that of contemporaneous collective burial, seen at Buena Vista and in several of the Caddoan foci.

11. Cremation was used at El Ebano, San Luis Potosí in the Huastec region. Although this is an archaic site, further field work might reveal the persistence of the custom into more recent times, as seems to be the case in the Spiro cul-

[16] Du Solier, 1946c.

tures, where Dr. Orr reported the use of such a practice.

12. Perhaps one of the most characteristic traits of both the Huastecs and the people of the southeastern United States was the "offering" of human skulls. In the Huastec region this trait has been found at Tamposoque, San Luis Potosí, and in the Tamuin murals, a fact which corroborates the assertion of the Spanish chroniclers that the Huastecs were accustomed to gather the severed heads of their enemies instead of making prisoners. This type of concept seems to have been common throughout the southeastern United States, where it is found expressed by means of engraved shells.

13. Conches cut so as to form an *ehecacozcatl* were found both in the northern part of the Huastec area and in the Allen and Sanders foci of northeast Texas.

14. The archaeological structures of the southeastern United States and the Huastec region both include basal platforms, or buildings, consisting of a series of several "stories" of thoroughly rammed clay superimposed and afterwards fired in situ. In the Huastec region this idea seems to have been limited to the older periods.

15. Finally, we have to report the presence of two other common traits, even if they do not possess a striking individuality: canoes represented in clay, and specially shaped bone drills.

These specific similarities, which came to my attention during the three days of the conference, could very well serve as a starting point for much more detailed research. They might possibly lead to the filling of gaps and to the precise definition of connections between the prehispanic cultures which flourished in Mexico, in particular in the Huastec region, and those of Texas, southeastern Oklahoma, southwestern Arkansas, and northwestern Louisiana.

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April, 1947

THE BUENA VISTA CERAMIC COMPLEX AND ITS CONNECTION WITH THE CADDOAN AREA

The major value of Du Solier's description of the discoveries at Buena Vista probably lies in its presentation of new material on a prehistoric culture in a part of northern Mexico which has long been neglected. It is also, however, of considerable interest to the archaeology of the eastern United States, for when taken in conjunction with the recent work of MacNeish in Tamaulipas, and Krieger on the "Caddoan" area, the Buena Vista culture appears to have important bearing on the time and direction of certain phases of culture borrowing between the high civilizations of Mexico and tribes of the southeastern United States.

Archaeologists have long been puzzled and intrigued by the ceramic complex most commonly called "Caddoan." It was part of Holmes Lower Mississippi Valley province and considered by him a division of his Middle Mississippi wares.[17] More recently, a general "Caddoan complex" has been held to represent a Lower Mississippi phase of the Mississippi pattern by a few archaeologists. The term "Caddoan," as used in ceramic connections, usually implies a strikingly rich array of vessel forms characterized principally by common use of engraved decoration (lines incised after polishing and firing), but also including incising, punctating, gouging, pinching, and plain surfaces. The bulk of such pottery is found in the adjacent states of Louisiana, Arkansas, Texas, and Oklahoma, but as will be shown, the decorative technique also extends across the Mississippi into Alabama, and north into the central Mississippi Valley.

In his study of village site collections in Mississippi and Louisiana, Ford pointed out that the "Caddo complex" extended into historic times, but there was also evidence of interinfluence with the prehistoric Coles Creek complex.[18] He also indicated a possible evolution of certain Marksville decorative styles into the Caddoan complex, and of Coles Creek into Caddo.[19] In their paper on the Crooks site in Louisiana, Ford and Willey stated:

> "It can now be demonstrated that in the Lower Mississippi Valley the later cultural stages, Troyville, Coles Creek, Caddoan, and the west coast of Florida developments, Weeden Island, and Safety Harbor, derived mainly from the cultural base provided by the Marksville (the local Hopewellian) stage."[20]

This rather confident and embracing statement was reaffirmed in the same authors' synthesis of eastern United States prehistory, where they suggested that the Caddoan complex was not formed until after 1540 and was derived mainly from the lower Mississippi Valley sequence of Marksville, Troyville, and Coles Creek.[21]

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[17] Holmes, 1903, pp. 101–4, Pl. IV.
[18] Ford, 1936, p. 254.
[19] *Ibid.*, pp. 262–8.
[20] Ford and Willey, 1940, p. 143.
[21] Ford and Willey, 1941, p. 353.

In the papers of Clarence H. Webb little attempt was made to discuss the origins of Caddoan ceramics, but he has demonstrated significant chronological differences within the Caddoan complex as defined by Ford for northwestern Louisiana.[22]

In a recent paper Krieger[23] has briefly mentioned two culture horizons in the "Caddo area," and correlated them with recognized horizons in the Plains and Mississippi Valley. The Spiro focus, with its ceremonial efflorescence, is included in the earlier of the two horizons, which Krieger states had developed well before 1500. Intrusive Puebloan sherds in northern and northeastern Texas were mentioned in support of such a dating. In a subsequent publication, issued by the University of Texas, Krieger treats the problems of cross-ties with the Puebloan Southwest in detail.[24] Strong evidence is presented for a greater age of cultures in the "Caddo area" than was allowed by the interpretations of Ford and Willey. By this dating, the highly developed ceramic complex of the later Caddoan horizon would have been present in northeast Texas and the adjoining states by 1400 A.D., and that of the earlier horizon by perhaps 1100 A.D. In both cases some time would have to be allowed for the cultures to develop, unless they had moved into the area en masse from elsewhere.

It has been mentioned that an outstanding feature of "Caddoan" ceramic complexes is the use of engraved lines made after the vessel had been fired and polished. Pigments were often rubbed into such lines and usually contrast pleasingly with the background; red ochre was most commonly used, but white, green, and blue clays also appear. Such a technique is not known in the early ceramic periods of the eastern United States, even in the lower Mississippi Valley. Its earliest appearance in the United States can, with reason, be safely ascribed to the general "Caddo area," probably to one of the five foci (Spiro, Sanders, Haley, Gahagan, and Alto) which Krieger includes in his earlier horizon (Gibson aspect). At present it seems probable that the Alto focus in east-central Texas was the earliest of the five, and therefore the most logical point of entry (in present knowledge) of the engraving technique into the eastern United States.

The spread of Caddoan peoples into eastern Louisiana and southeastern Arkansas from the Red River region was of very late date, as the studies of various individuals have amply testified. Likewise, these peoples spread westward into the plains of Texas and Oklahoma in very late prehistoric, or possibly in early historic, times.

About the mouth of the Arkansas River the engraving technique occurs in the Alpika focus, a type site being that at Walls, Mississippi,[25] and to the north in related sites such as Pecan Point[26] and Bradley.[27] Farther north, engraving was sometimes employed on the inner surface of plate rims in such late Middle Mississippi complexes as the Trappist and Spoon River foci. The most easterly extension of engraving as part of a ceramic complex is to be found in the Moundville focus. It is here suggested that this engraving had spread to the east and north from the "Caddo area."

In the spring of 1946, Richard S. MacNeish of the University of Chicago made a survey of the eastern and northern portions of the state of Tamaulipas.[28] Among other interesting results of his work was the identification of a ceramic complex from the Pueblito site which bears certain resemblances to "Caddoan" wares. Upon examining the Pueblito collections of MacNeish in Austin, Krieger was of the opinion that in paste, temper, color, polish, and general "feel" the closest resemblances lie rather definitely with Alto focus pottery in east-central Texas. The carinated bowl with flat base appears in both areas. But on the whole the vessel forms are different. In design conception, consisting of simple straight-line motifs such as triangles and diagonals, to the exclusion of curvilinear motifs, Krieger believes that the Pueblito engraved pottery resembles that of Sanders focus much more than Alto. Sanders focus components lie farther north than Alto, principally in the Red River basin along the Texas-Oklahoma border, and it is thought that Sanders dates somewhat later than Alto although the two foci hold several traits in common. Whether the closest analogies to MacNeish's Pueblito ware lie with Alto or Sanders, it is doubtlessly significant that any possible connection with the "Caddo area" is with the earlier of the two major horizons in the latter

[22] Webb and Dodd, 1941.
[23] Krieger, 1945, p. 509.
[24] Krieger, 1946.
[25] Brown, 1926.
[26] Moore, 1911, pp. 427–74.
[27] Moore, 1905 and 1907.
[28] Reported in the first article of this issue. *Editor.*

territory. Furthermore, the Buena Vista pottery to be mentioned below is very distinct from, and probably later than, the Pueblito complex nearby in Mexico, and on the other hand compares very favorably with one of the pottery complexes in the later horizon (Fulton aspect) in Caddoan territory.

Subsequent to the examination of MacNeish's collections, Wilfrido Du Solier allowed Griffin to examine the material obtained by him, in company with Gordon Ekholm, at the Buena Vista site, San Luis Potosí, in 1942. The Buena Vista pottery has as a strong element in its decorative complex incised and engraved rectilinear designs on a highly polished gray to black monochrome with pigment rubbed into the lines. This technique is of wide distribution in Middle American archaeological cultures, and of considerable temporal depth, but the specific Buena Vista type, called greyish-black by Du Solier, shows somewhat stronger resemblance to the type Barkman Engraved in northeast Texas and southwest Arkansas than do any other known Mexican types. Two sherds included in greyish-black ware by Du Solier (Pl. II, A, *h*, *i*), if found in the Southeastern United States, would likely be regarded as poor imitations of the lower Mississippi Valley type Coles Creek Incised. According to Krieger, however, the type Barkman Engraved includes variations, such as incised lines with subsequent polishing, which are difficult to distinguish from engraved lines and are also occasionally remindful of Coles Creek Incised.

After Griffin had sent Krieger some rather inadequate drawings of the greyish-black sherds from Mexico, he expressed his opinion that some of the sherds were surprisingly close to Barkman Engraved in decorative technique and pattern. At the First Symposium on the Caddoan Archaeological Area, held in Norman, Oklahoma, September 12–14, 1946, Du Solier provided characteristic sherds of the greyish-black ware, while others had brought type sherds from various complexes in the "Caddo area." We were then able to see and handle the sherds in question, and the three of us were in complete agreement that Barkman and greyish-black are so nearly alike that it would be hard to separate them if unlabeled. The type Barkman Engraved is a common and characteristic part of the ceramic complex of Texarkana focus, which Krieger now believes dates from no later than 1400 or 1450 A.D. to about 1600 or 1650. Thus, if the greyish-black type at Buena Vista can be said to date approximately 1200 A.D., there is still a gap of perhaps 200 years between this and the Texarkana focus. Our dating methods are not so certain as yet, however, that the 200 years might not be resolved eventually. It must be pointed out that this length of time was probably not "taken up" by the gradual diffusion of Buena Vista ceramic elements northward as far as the northeast corner of Texas, for there is no known occurrence of comparable pottery between the two areas. If there was any direct connection between these two pottery complexes, it might best be explained as a diffusion of concepts rather than a movement of people, for there are too many Mexican culture elements which do not appear in Texarkana focus.

It is also of interest to note that the Buena Vista site had a few negative painted sherds which represent the most northeasterly occurrence of this technique in Mexico. Negative painting is not a part of the Caddoan ceramic complex (although occasional trade pieces are known), but it is a fairly strong element in certain portions of the eastern United States[29] and its presence may best be explained as an importation.

Du Solier has referred to platform pipes in the general area of Buena Vista. These pipes are not of the Hopewell style but are of the type which has sometimes been called Caddoan with rather large ovoid to circular bases and a centrally placed cylindrical bowl. The presence of these pipes in the state of San Luis Potosí can be regarded as a possible north-to-south exchange on the basis of the known numerical predominance of these pipes in the Caddoan area. There is a logical prototype in the Hopewellian platform pipe, and the center of dispersion of the "Caddoan" type would seem to be in the southwest central United States.

The technique of incising and engraving with use of pigments to fill the lines occurs in the earliest ceramic horizons of central Mexico and Guatemala. It is particularly strong in the archaic cultures of the Valley of Mexico and a possible continuation of this concept may have survived in the Buena Vista area. Ekholm, Kelly, and others have shown that this decorative style was commonly employed in northwest Mexico at, roughly speaking, 1300 A.D.[30] It may therefore be suggested that at a time

[29] Willey and Phillips, 1944.

[30] Ekholm, 1942, p. 130.

conforming to the early stages of the Mixteca-Nahua horizon, the decorative technique of engraving and incising on a polished monochrome pottery had become established from west to east across the northern margins of the Middle American province in Mexico, and had then been transferred to the "Caddo area." Here it became strongly established and finally came to be used with considerable skill over a large territory.

We have said that such a transfer may have occurred during the early stages of the Mixteca-Nahua horizon, i.e., at about 1200–1300 A.D., but the date of the earliest appearance of this technique in the "Caddo area" is still uncertain. It was mentioned that Krieger regards the Alto focus as the earliest known complex with this technique in the eastern United States. At the Davis site in Cherokee County, east Texas, type site for Alto focus, Krieger believes there is some evidence of the contemporaneity of three distinct ceramic complexes. One of these is a sand tempered pottery bearing a resemblance to the Alexander series of the Southeast. Another complex is represented by trade pottery of Marksville (southern Hopewellian) and/or Troyville types, and a third complex includes highly polished brown and black bottles and bowls with very finely engraved lines filled with red pigment. The last-mentioned complex of engraved pottery is readily distinguished from the late prehistoric material in the same area. That the three complexes were contemporaneous is possible, but it is probably too early to accept this as demonstrated until other sites clearly indicate such an association. If this interpretation is correct it would strengthen the hypothesis of an introduction of engraved pottery into Texas from Mexico at an earlier time than heretofore suspected. Since the Davis site includes a large pyramidal mound and village in which the three ceramic complexes occur, it may further be suggested that this is one of the earliest appearances (if not the earliest), of the pyramidal mound concept in the southern United States.

In summary, there are reasons to believe that a technique of decorating polished pottery by engraving (cutting through the finished surface) or, occasionally, polishing over incised lines before firing, was introduced into the so-called "Caddo area" from Middle America. Subsequently it became a general feature of the ceramic tradition throughout the "Caddo area" in four states, being applied to a great variety of vessel forms with many locally specialized trends. There are two culture horizons in this area, in both of which engraving is common to every focus, but there are such distinctions in vessel form and design pattern between the two horizons in general that anyone well acquainted with the material experiences little difficulty in recognizing them. At present, it seems possible that the Alto focus was the earliest culture in the eastern United States in which engraving was employed. If this is true, it is interesting to note that MacNeish's Pueblito culture of the Sierra de Tamaulipas bears engraved pottery which is similar in many respects to that of Alto focus, but also resembles that of Sanders focus in the same horizon in its simplicity of design.

A second matter involves the very striking resemblances between the greyish-black engraved-incised pottery of Buena Vista in San Luis Potosí, and the Barkman Engraved type of the Texarkana focus in extreme northeast Texas and southwest Arkansas. According to Du Solier the former probably belongs to the Tula-Mazapan horizon (900–1200 A.D.), while Krieger places the Texarkana focus at about 1400 or 1450 to 1600 or 1650 A.D. Both admit, however, that adjustments may be forthcoming in these dates and there may not actually have been any appreciable difference between these two cultures.

Returning to the first matter, there is evidence that Pueblito was somewhat older than the Buena Vista culture on the one hand, and that the Alto and Sanders foci were older than Texarkana focus on the other. Thus is appears possible that a transfer of the engraving technique from the northern reaches of Middle America into the "Caddo area" took place at least as early as Tula-Mazapan times, and perhaps earlier. Subsequently, another contact took place between these areas, expressed in the close similarity of greyish-black pottery and Barkman Engraved; this contact would seem to date toward the end of the Mazapan period or possibly in early Mixteca-Nahua times.

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AN ARCHAEOLOGICAL RECONNAISSANCE IN TAMAULIPAS, MEXICO

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INTRODUCTION

ALTHOUGH the importance of the northwest Gulf coastal region in the problem of Mexican-Southeastern relationships frequently has been pointed out, the region has received comparatively little archaeological investigation. As a relatively uniform and unbroken territory, stretching from the Caddo area on the east to the Huastec area on the south, the region forms one of the most likely routes of land communication between the advanced cultures of Mexico and those of the Southeast. Inhabited at the time of the Conquest by numerous bands of nomadic hunters, fishermen, and food-gatherers who left nothing comparable with the spectacular remains of their neighbors to the east and south, the region generally has been neglected in favor of richer fields.

One of the least known portions of the northwest Gulf coastal region, that extending from the Huastec area on the south to the Rio Grande on the north, also is one of the most significant with regard to the question of possible Mexican influence on the Southeast. South Texas and the Texas Gulf coast, although by no means adequately known, have been investigated to some extent by several archaeologists, including Jackson, Sayles, Martin, and Anderson.[1] The only published information on the northeastern corner of Mexico, however, is contained in three reports by Staub, Mullerried, and Mason. Staub reports the finding of several projectile points in northern Tamaulipas;[2] Mullerried describes a collection of artifacts, reputedly from a site just south of the Rio Grande which he examined in Mexico City;[3] and Mason mentions the discovery of a Huastec vessel near San Fernando.[4] These references to the area are more tantalizing than informative, considering the fact that the area lies just beyond the northeasternmost center of advanced culture in Mexico.

The Huastec area, since it represents the maximum known extension of Mexican civilization in the direction of the Southeast, appears to be one of the most probable sources of influence on the Southeast from Mexico. In the sixteenth century, the Huastecs, who are affiliated linguistically with the Maya, were a thriving, civilized people living for the most part near the Panuco River, in what is now southern Tamaulipas. The Huastec area was famous among the Aztecs and others as a land of great natural abundance, and as the legendary source of many features of Mexican culture. Recent excavations by Ekholm in several mound and village sites near Tampico indicate that the area has been inhabited over a long period of time by pottery-making people, who went through at least six stages of ceramic development.[5] Although the northern boundary of Huastec territory in Conquest times is known with reasonable accuracy from a number of historical records, almost nothing is known of the northern range of Huastec settlement during the various prehistoric periods. Finds of Huastec pottery by Mason near San Fernando and by Anderson near Brownsville[6] suggest that the prehistoric range of Huastec influence may have extended a considerable distance beyond the historic boundary of the Huastec area. Unfortunately, information as to the nature of Huastec relationships with their northern neighbors during the historic period, which would be highly pertinent to the Mexican-Southeastern problem, is apparently none too plentiful, although additional research is needed along this line.

It seems likely that the importance of any historic trade or migration activities from the Huastec area might best be indicated by the extent to which traces of such activity are present in the adjoining territory to the north. The northern neighbors of the Huastecs in the six-

[1] To the above list must now be added the work of MacNeish, reported in the first article of this issue. *Editor.*

[2] Staub, 1923.

[3] Mullerried, 1934.

[4] Mason, 1935.

[5] Ekholm, 1944.

[6] Anderson, 1932.

teenth century consisted of a great many bands of primitive nomads, living in isolated *rancherías* and speaking kindred dialects of a language which Moreno classifies as the Tamaulipec branch of the Coahuiltec family.[7] Because of their fierce resistance to the encroachment of Western civilization, the Tamaulipecs were exterminated rapidly, so that historical sources provide little more data about them than tribal

FIG. 4. Map of northern Tamaulipas.

lists and brief descriptions. On the basis of the limited evidence available, however, the boundary between the Tamaulipecs and the Coahuiltec proper is generally placed in the vicinity of the Rio Grande, or a short distance to the south of that river.[8]

In order to add something to the inadequate picture of Tamaulipec archaeology, and to determine, if possible, the nature and extent of Huastec manifestations in the area, the reconnaissance described in this report was undertaken by the writer and his wife early in the month of December, 1945. It was planned originally to devote the entire month to an intensive survey of the northern half of Tamaulipas. After several delays occasioned by a gasoline shortage which developed en route to Mexico City, where permission to make the survey was secured from the Instituto Nacional de Antropología e Historia, little more than a week remained for actual field work. It was decided, therefore, that the best results could be achieved in the shortest time by limiting the project to a surface reconnaissance along the new highway between Ciudad Victoria and Matamoros, since this route runs diagonally across the entire northern half of Tamaulipas (Fig. 4).

Most of the territory included in the reconnaissance possesses natural characteristics similar to those of south Texas, and may be regarded as part of the same geographic province. Ciudad Victoria, the starting point of the reconnaissance, lies on a rolling, gently sloping tableland which stretches along the eastern base of the Sierra Madre Oriental, broken occasionally by swift mountain streams pouring from the abrupt front range. From Victoria, the highway winds in a northeasterly direction across the tableland, which becomes more and more broken, and gradually descends through scattered foothills to the Gulf coastal plain a few miles beyond San Fernando, over which the road runs for the rest of the 300 kilometers to Matamoros. Visible from the highway throughout much of the journey are two relatively small and isolated mountain ranges, the Sierra de San Carlos, which rises from the foothills to the north, and the Sierra de Tamaulipas, which rises from the coastal plain to the east. The foothills are carved chiefly from thin-bedded limestone formations, capped here and there by layers of gravel. Soil-covering in the foothills, when present, is usually shallow and composed of black gumbo or gravelly red clay. The coastal plain is an extensive zone of low-lying, unconsolidated Quaternary formations, which merge imperceptibly with the broad flat silt deposits of the Rio Grande delta.

The area is drained by several large streams, the most important being the Río Soto la Marina and the Río Conchas, and by countless small tributaries. Along that portion of their course traversed by the highway, the major steams drop with some rapidity through fairly narrow valleys, and are subject to considerable fluctuation in depth, although, unlike most of the minor streams, they are perennial. Alluvium of the smaller steams tends to be dark and rather shallow gumbo, while deposits of the larger streams are usually buff-colored, relatively deep sands and gravels, exposed in places

[7] Moreno, 1936.

[8] Kroeber, 1939, p. 70.

to a depth of about thirty feet. The frequency of shallow washes, deep gullies, and steep cut-banks along most of the streams indicates that processes of erosion currently are predominant over those of deposition.

Most of the hill country is overgrown densely with scrubby mesquite and various species of thorn and cactus bushes, although cypress, oak, and other trees are present along the few perennial streams. The vegetation thins out somewhat toward the coastal plain, where extensive mesquite thickets prevail, and finally assumes a savanna-like aspect as one approaches the delta.

Tamaulipas still abounds in many varieties of game, and is one of the most popular hunting grounds in Mexico. *Tigre*, deer, coyote, and many smaller animals are common, as well as waterfowl and numerous other birds.

Northern Tamaulipas is subject to heavy precipitation in the summer wet season, but during the winter dry season rainfall is rare and the temperature is pleasantly warm. According to local informants, summer rains keep all roads impassable for most of the season, including the new highway, which at present has fords or ferries in lieu of bridges.

Settlement is exceedingly sparse in the hill country, where the chief occupation is stock-raising, but the coastal plain is slightly more populous, with considerable agriculture. In general, towns are few and far apart.

SITES

The technique of "roadside archaeology" used on the reconnaissance disclosed a total of twelve sites. With the exception of a single site discovered en route to Mexico City, located on the Reynosa-Monterrey highway approximately 156 kilometers west of Matamoros, all were found along the stretch of highway between Padilla and San Fernando, where searching was most intensive. Locations of the sites are indicated in the table at the top of the next column.

Considering the fact that so many sites were revealed along the narrow cross section afforded by the road, and the fact that most of the likely-looking spots examined proved to be sites, the Padilla-San Fernando section would seem to be fairly rich in archaeological remains. The same is probably true for much of the Reynosa-Monterrey route, where many promising places for aboriginal occupation were observed, although time permitted examination of only one

Site no.	*Distance (kilometers)*	*Direction*	*From*
1	156	west	Matamoros
2	6	southwest	Padilla
3	14	southwest	Jimenez
4	13	southwest	Jiminez
5	2	northeast	Jimenez
6	8	northeast	Jimenez
7	26	northeast	Jimenez
8	29	northeast	Jimenez
9	31	northeast	Jimenez
10	36	northeast	Jimenez
11	40	northeast	Jimenez
12	52	northeast	Jimenez

of these. Several promising locations were investigated on the coastal plain between San Fernando and Matamoros, but no sites were found in this section. A more thorough search probably would disclose sites on the banks of the numerous *resacas*, or basins, of the plain.

All twelve of the sites discovered were open camp sites, situated on the edge of small arroyos, which were dry at the time of the reconnaissance. Considerable searching along the banks of the larger streams revealed occasional flakes of flint, but no sites were encountered. Whatever the reason for this peculiar paucity of remains along the major streams, further exploration should bring to light both surface and buried sites in their vicinity, since desirable camp grounds are plentiful and conditions are more favorable for discovery than along the smaller branches.

Along the smaller streams, most of the sites were so thoroughly hidden by a dense screen of underbrush that, once a site was discovered, it was impossible to determine its exact extent, or to find a fair sample of artifacts. However, occasional exposures of the culture deposits in the sides of washes, animal trails, or road excavations, usually revealed a zone of black earth, containing numerous flakes of flint and chert, as well as scattered artifacts. The culture deposit reached, on some sites, an extent of more than an acre, and a depth of as much as three feet. The black soil of the culture zone often was characterized by the presence of thousands of white snail shells, which gave a distinctive polka-dot effect.

In sites which were cut by erosion or excavation, small buried hearths, composed of clusters of burnt chert and limestone fragments, some-

times were found, and scattered stones showing the effects of fire were present at all of the sites. Many of the flakes and artifacts collected likewise were burnt.

No other features were noted on any of the sites.

ARTIFACTS

A total of 199 specimens was collected from the twelve sites. This figure provides little indication of the richness of the sites, however, since most of their contents were hidden by soil and vegetation. That some of the sites would yield a great many artifacts if excavated is suggested by the large number of artifacts found in some exposures.

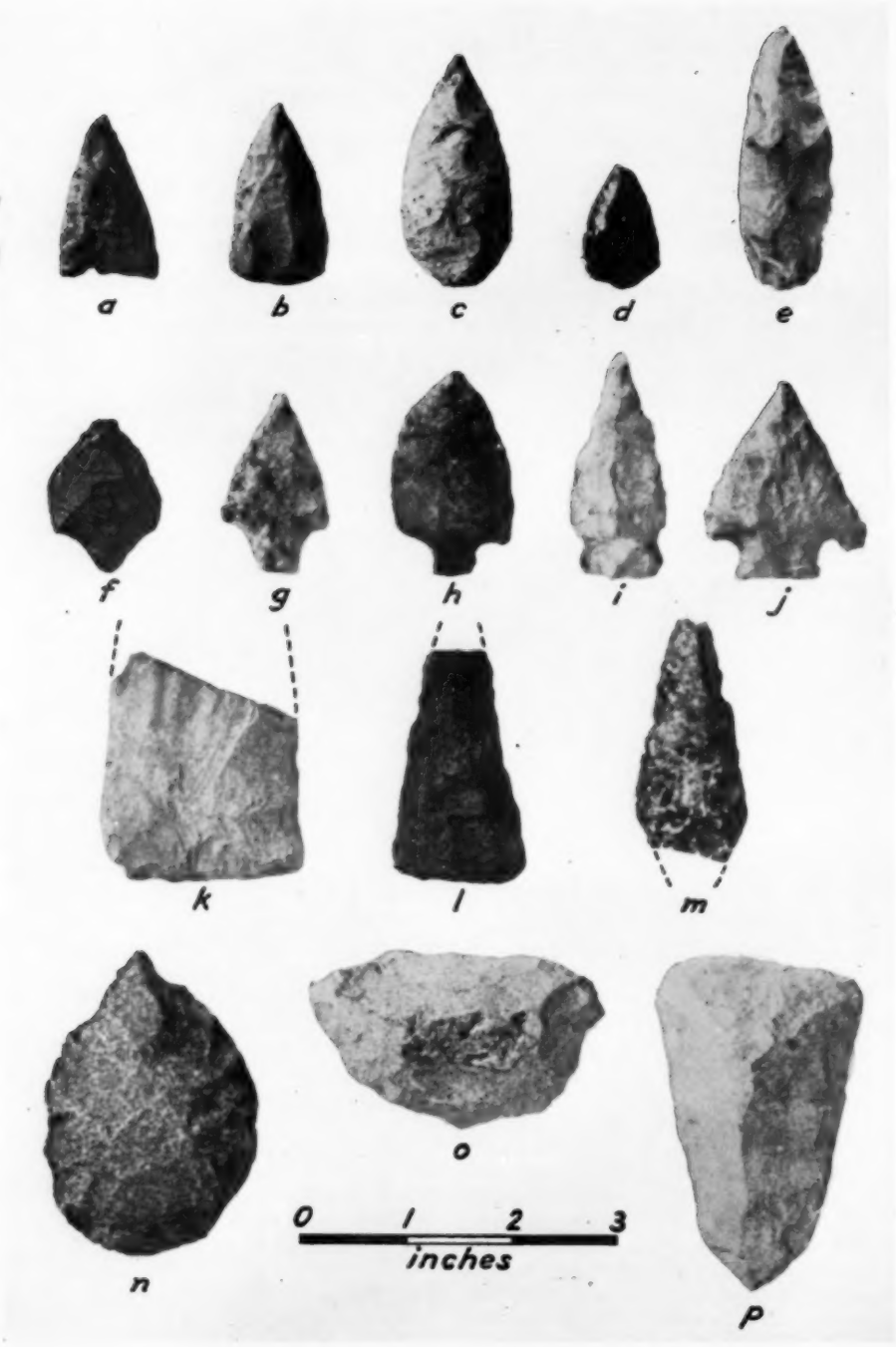
Of the specimens collected, 187 are chipped stone artifacts, 6 are pieces of ground stone, and 6 are potsherds (Table 3). Four fragments of sea shells were found, and a few muscle shells and slivers of bone were noted, but no shell or bond artifacts were discovered.

All of the stone artifacts appear to be made of materials obtained from local gravel beds and limestone formations. Most of them consist of poor-quality flints and cherts ranging in color from light gray to dark brown. A few are composed of white chert, and some possess a well-developed patina. A better grade of black flint increases in frequency as one approaches the coast. No obsidian was found, although it is common in the Huastec area to the south.

No typological significance is claimed for the artifact classes listed in Table 3. Due to the absence of stratigraphical data, and the lack of sufficient distributional evidence, the artifacts have been grouped into descriptive rather than

Table 3. Artifacts by Classes and Sites

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*Totals*
Chipped stone													
Projectile points													
Stemless													
Triangular	5										1		6
Subtriangular		1	4					1					6
Leaf-shaped		2		1				2					5
Ovate	3									1	2		6
Lanceolate							1	1					2
Stemmed													
Rounded-stem				2				1			1		4
Contracted-stem		1	3	1				1					6
Corner-notched			1										1
Side-notched			1										1
Barbed			1					1					2
Reworked			1										1
Knives													
Straight-based	3		17					4		1			25
Convex-based	1		6		1			3			2		13
Lozenge-shaped								1					1
Blades	9		23	4	1	2		3	1	1	1		45
Scrapers													
Keel-back				1									1
Side			2					1		1			4
Flake	1		5			1		3					10
Gravers	1		1										2
Unclassifiable	2		24	2	3			5		6	1	3	46
Ground stone													
Grinding slab (fragments)			5										5
Pigment	1												1
Pottery (sherds)			5		1								6
Totals	26	4	99	11	6	3	1	27	1	10	8	3	199



Artifacts from various sites in northern Tamaulipas.

typological categories. Since certain classes of artifacts in the series tend to merge imperceptibly with others, the lines between classes have been rather arbitrarily drawn in some cases. This is especially true of several small stemless artifacts which may have been used as projectile points, knives, or blades of some sort. In general, such specimens have been distinguished on the basis of size and crudity, knives being considered larger than projectile points and blades more crude than knives.

Projectile points. The 40 artifacts classified as projectile points are of two kinds, stemless and stemmed.

Stemless points, which number 25, fall into five classes: (1) Triangular. All six of these points are thin and well-retouched, with nearly straight bases and edges (Pl. V, *a*). In several cases, thinning has been accomplished by removal of relatively large flakes from the base. (2) Subtriangular. These six points (Pl. V, *b*) differ from the triangular variety in having somewhat more convex bases and edges, and in being somewhat thicker, with a resharpened look, although bases usually are thinned in a similar manner. (3) Leaf-shaped. This class consists of five carefully executed points, thin and well-retouched, with symmetrical outlines (Pl. V, *c*). They tend to be slightly flattened on one face, and curved in longitudinal cross section. Two of these points are heavily patinated. (4) Ovate. The six points of this class (Pl. V, *d*) are small and fairly thick, but well made. One specimen is slightly beveled. (5) Lanceolate. The two points of this shape (Pl. V, *e*) are relatively large, thick, and poorly retouched.

Stemmed points, numbering 15, may be divided into six classes. (1) Rounded-stem. These four points are characterized by short, rounded stems (Pl. V, *f*). Shoulders vary from slight to distinct, and blades usually are somewhat short, with convex edges. Two or three retain much of the original flake surface on one face, due to incomplete retouching. (2) Contracted-stem. The stems of these six points (Pl. V, *g*) range from sharply contracted to almost parallel-sided, but the points are rather uniformly thin and carefully retouched, with nearly straight edges and definite shoulders. Both stems and blades are longer than those of the preceding class. (3) Corner-notched. The single point of this class (Pl. V, *h*) differs from the rounded-stem variety only in the shape of stem and shoulders, which give the impression of having been produced by notching the corners of a leaf-shaped blade near the base. (4) Side-notched. This point, the only one of its kind (Pl. V, *i*), resembles the stemless lanceolate point, except for the presence of shallow notches on both sides near the base. (5) Barbed. Only two points with definite barbs are represented (Pl. V, *j*). Both are large, broad points, with short, wide stems and straight-edged blades. (6) Reworked. This specimen has a large, broad stem, slight shoulders, and a short blade which evidently has been reworked. It is fairly thick, but well made.

Knives. The 39 artifacts classed as knives may be assigned to three groups. (1) Straight-based. This variety (Pl. V, *k*) includes 25 specimens, distinguished by possession of straight or only slightly convex bases. They tend to be relatively large and broad, thin and well made. (2) Convex-based. These 13 knives (Pl. V, *l*) are characterized by convex bases, and tend to be smaller and narrower than in the foregoing class. (3) Lozenge-shaped. Only one specimen of this shape was found (Pl. V, *m*). Unfortunately, its base is missing, but it appears to have been beveled on both ends.

Blades. Forty-five specimens of various shapes and sizes fall into this category, but all are distinguished by their thickness and lack of retouching. They range from subtriangular to oval in shape, and from large, broad specimens to tiny, narrow ones. These unspecialized, rather amorphous artifacts probably were used in various ways, but few possess any indications as to what might have been their functions. Two or three, however, which terminate in peculiar, beak-like points (Pl. V, *n*) may be large graving instruments; several which show signs of use may be mauls or choppers; and some, which have no traces of wear, may represent blanks.

Scrapers. Only 15 artifacts can be recognized as possible scraping tools, a figure which represents a surprisingly low proportion for what appears to be a hunting complex. The scarcity of scrapers may be partly apparent rather than real, due to inadequate sampling, but it seems probable that an actually low proportion exists in the area. Three kinds of scraping instruments were found. (1) Keel-back. This variety is represented by a single specimen (Pl. V, *p*). It is a large, thick, carefully-shaped tool made of dull, white chert. One face is flat and unworked except near the pointed end; the other is high near the scraping edge, forming a roughly triangular pyramid, and retouched all the way around. (2) Side. These four artifacts (Pl. V, *o*)

are very thick, with the outline of an oval pointed on both ends, and have one face flat, with part or all of both edges retouched from the flat face. (3) Flake. The 10 specimens of this class are merely flakes of irregular shape, unworked except for partial retouching from one or both faces.

Gravers. These are two irregular flakes possessing a small sharp beak at the junction of two retouched edges.

Unclassifiable. Forty-six specimens are too fragmentary for classification. Most of these are projectile point or knife tips.

Grinding slab fragments. These five pieces were found together, and appear to be fragments of a single slab. They are small, thick blocks of a coarse, medium hard, dark gray sandstone, with slightly concave, worn-looking surfaces on one side. Since no manos were found, the interpretation of these specimens as grinding slab fragments seems questionable.

Pigment. A single small pebble of soft red ochre with smoothed faces may represent a source of paint.

Pottery. The only pottery discovered consists of six small plain body sherds, made of tan-colored, slightly grainy paste containing numerous fine, white specks of some unknown material. The exterior surfaces of the fragments have the same color as the paste and are fairly smooth and even. Interior surfaces are more reddish and somewhat rougher than the exterior. The sherds range in thickness from 5 to 10 millimeters, and have a hardness of about 3. Method of manufacture is indicated by traces of a coil along the break of one of the specimens.

COMPARISONS

Obviously the incomplete information on the Tamaulipec area afforded by such a brief reconnaissance does not permit detailed comparisons with surrounding areas. Any thorough analysis of the cultural relationships between the Tamaulipec area and adjacent areas must await more information on cultural complexes and sequences in the region as a whole. However, a few comparisons at this stage might provide some indications as to where such relationships are to be sought, and some hints as to their nature.

Since the historic inhabitants of the area reconnoitered were related linguistically and culturally with their Coahuiltec neighbors to the north, we naturally look first to the Coahuiltec area for archaeological comparisons. Although much remains to be learned about the archaeology of the Coahuiltec area, some information is contained in reports by Mullerried, Anderson, Martin, and Sayles.

Mullerried describes 109 chipped stone artifacts from fifteen surface sites in eastern Coahuila.[9] His collection apparently contains examples of all the classes of chipped stone artifacts found in Tamaulipas, but the proportions of his classes are notably different, especially in the higher frequency of stemmed points and keel-back scrapers. A few additional varieties also are present, such as barbed points with convex-based stems, concave-based stemless points, and a small stemmed arrowpoint.

Anderson does not describe the stone artifacts of his Rio Grande delta sites in his report,[10] but parts of his extensive collection have been cursorily examined, and specimens representing most of the classes found in Tamaulipas were noted. Although the collection probably contains artifacts belonging to several different complexes, it is dominated by small ovate to triangular points of black flint, quite similar to those described above. It is distinguished from the writer's Tamaulipas collection chiefly by the presence of great quantities of worked shell and considerable pottery.

Martin's Corpus Christi sites,[11] which may be partly Karankawan in origin, also differ from the Tamaulipas sites in possessing much worked shell and pottery, as well as stemmed arrowpoints and other characteristic traits. However, a few sites lack both pottery and stemmed arrowpoints, and are marked by the presence of triangular and leaf-shaped points resembling those of the Tamaulipas sites.

According to Sayles,[12] Coahuiltec sites consist of hearths scattered extensively along small streams. Typical artifacts include triangular and leaf-shaped points, and flake and core scrapers. Manos and metates are absent. The same traits are attributed to Brownsville and Corpus Christi sites, but both are assigned additional traits. A similar statement could be made for Tamaulipas sites, if one allows for the scarcity of scrapers, and overlooks the possible presence of a grinding slab.

A few less specific, but possibly significant, similarities are found in other areas. Duplicates

[9] Mullerried, 1934.
[10] Anderson, 1932.
[11] Martin, 1929, 1930, 1931.
[12] Sayles, 1935.

of some Tamaulipas artifacts, such as the keel-back scraper, exist in central Texas, and the contracted-stem projectile points of Tamaulipas find their counterparts in the cave sites of the Big Bend and Pecos river areas. In most other respects, however, these areas are very different from the Tamaulipec area.

The only evidence of any relationship with the Huastec area consists of the six sherds. These were examined by Ekholm, who noted similarities in paste and other characteristics to a type called Zaquil Red, which flourished during Periods IV and V.

CONCLUSION

The two main objectives of the reconnaissance, first, to find out more about the archaeology of the Tamaulipec area, and, second, to learn more about the nature of Huastec influences in the area, were accomplished only to a limited extent.

The archaeology of the area is about what the cultural status of its aboriginal inhabitants would lead one to expect. Some information was obtained as to the types of sites and kinds of artifacts to be found in the area, but insufficient evidence was gathered to permit determination of cultural divisions and development. The occurrence of several distinct styles of projectile points suggests the existence of different complexes. The apparent absence of any points which could definitely be called true arrow-points may be a significant feature of the area, but any generalizations as to cultural differentiations and chronology must await the forthcoming of additional data.

Tamaulipas sites appear to compare most closely with those of the Coahuiltec area, although suggestive similarities exist in other areas. The wide distribution of leaf-shaped and triangular projectile points in south Texas and northeastern Mexico may point to the existence of a common basic culture throughout the region, with important variations caused by local development or outside influences, but this hypothesis must remain within the realm of speculation until much more work has been done in the region.

The paucity of Huastec materials revealed by the reconnaissance, together with the lack of any knowledge of mound or pottery sites on the part of the natives of the area, indicate that Huastec connections with the interior of northern Tamaulipas were slight. Although the existence of actual Huastec sites in the area is by no means precluded by this negative evidence, it seems most likely that the six sherds discovered were introduced through the medium of trade. The extent and duration of such contact remains a moot question.

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Lincoln, Nebraska
January, 1947

PRELIMINARY NOTE ON THE DISCOVERY OF FOSSIL MAN AT TEPEXPAN IN THE VALLEY OF MEXICO

HELMUT DE TERRA

MY GEOLOGICAL and archaeological studies in the Valley of Mexico, which I have carried out since the end of 1945 under the auspices and with the aid of the Viking Fund, Inc. of New York, were rewarded on February 22 of this year (1947) by an extraordinary find of human skeletal remains in the Upper Pleistocene Bercerra formation at Tepexpan, in the State of Mexico. So far the quest for genuine fossil human remains in North America has been a tantalizing venture because of the incomplete state of preservation and the uncertainty of dating. In this respect the Tepexpan find would seem to meet many of the requirements necessary for assigning it to a known geological formation dating back to the close of the Ice Age.[1] Moreover, the formation in which the human fossil was excavated has yielded at several other localities artifacts which must be regarded as more or less contemporary.

Inasmuch as field work is progressing in various directions and through different methods in the vicinity of the find, a preliminary announcement would seem to be warranted. In presenting this I wish to express my sincerest thanks for the generous aid given to me by the Viking Fund, and to Dr. Hans Lundberg without whose preliminary geophysical survey this discovery would probably not have been made in such a short time. The fine cooperation given to me by the director of the Instituto de Geología of the National University of Mexico, Ing. R. Manges Lopez, and by various members of its staff, especially by Ing. A. R. V. Arellano is gratefully acknowledged. Sr. Arellano not only witnessed the actually discovery but collaborated with me in the stratigraphic work. I am also indebted to the assistance given by Dr. J. Romero, physical anthropologist at the Museo Nacional de Antropología, and to its director, Dr. Rubin F. de la Borbolla. At this stage of my writing, preparations are under way to assure proper anatomical study of the find.

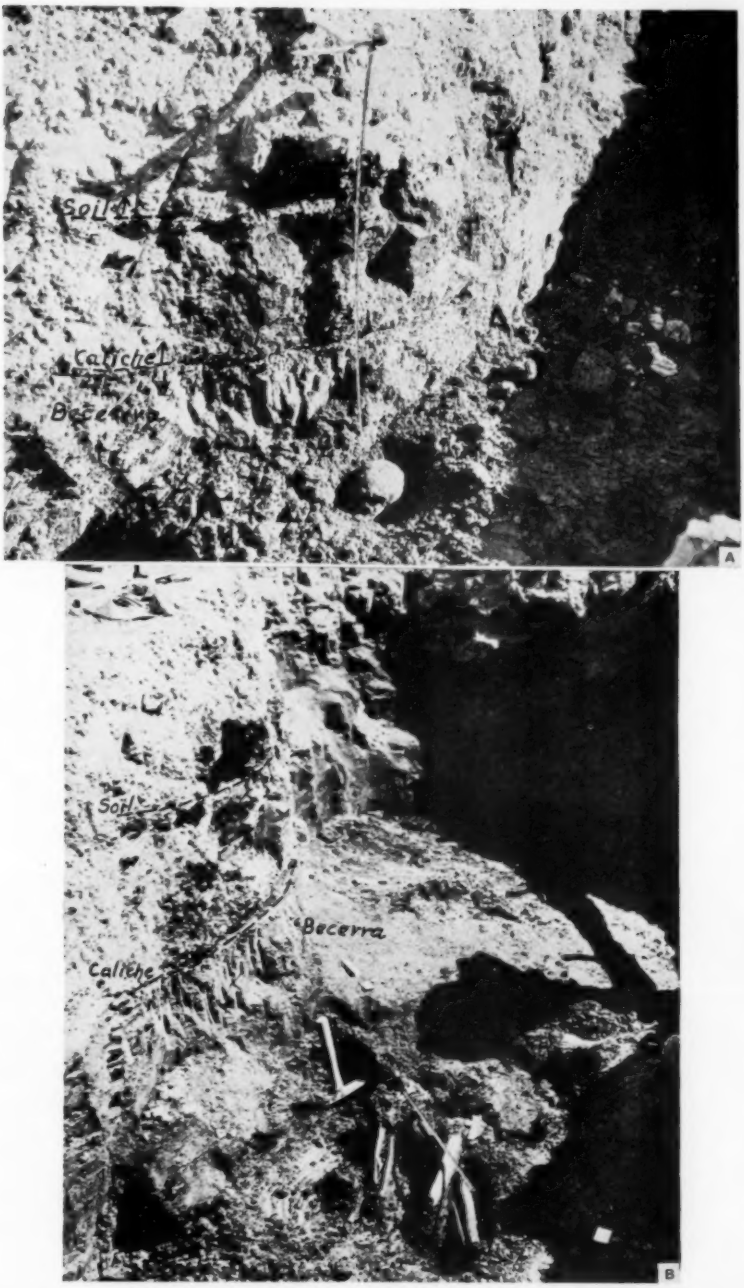
CIRCUMSTANCES WHICH LED TO THE DISCOVERY

In November, 1945 I started my geological studies on the Late Quaternary of the Valley of Mexico with the intention not only of clarifying the relationships between glaciation and probable lake changes but of tracing the prehistory of man in this region which is so extraordinarily rich in archaeological remains. These studies followed upon some preliminary work initiated by Professor Kirk Bryan[2] and Ing. Arellano which dealt with fossil soils and erosional cycles in the Upper Pleistocene of that region. This period is represented by two major climatic and sedimentary stages, characterized both by a variety of glacial deposits on the flanks of the high volcanos and by a complex sequence of pluvial deposits in the basin proper. These relationships have been summarized in Table 4, which shows that two pluvial or glacial substages of the Wisconsin are separated by a dry period and are followed by a caliche formation which marks the end of the Pleistocene, or the beginning of the Early Recent. It must be emphasized that this stratigraphic scheme is chiefly based on a variety of geological criteria to which the paleontological evidence in this instance is subordinate. Such an approach has the advantage of placing the emphasis on geological dating so that the possibility of continued survival of Late Pleistocene mammals cannot seriously effect the stratigraphy.

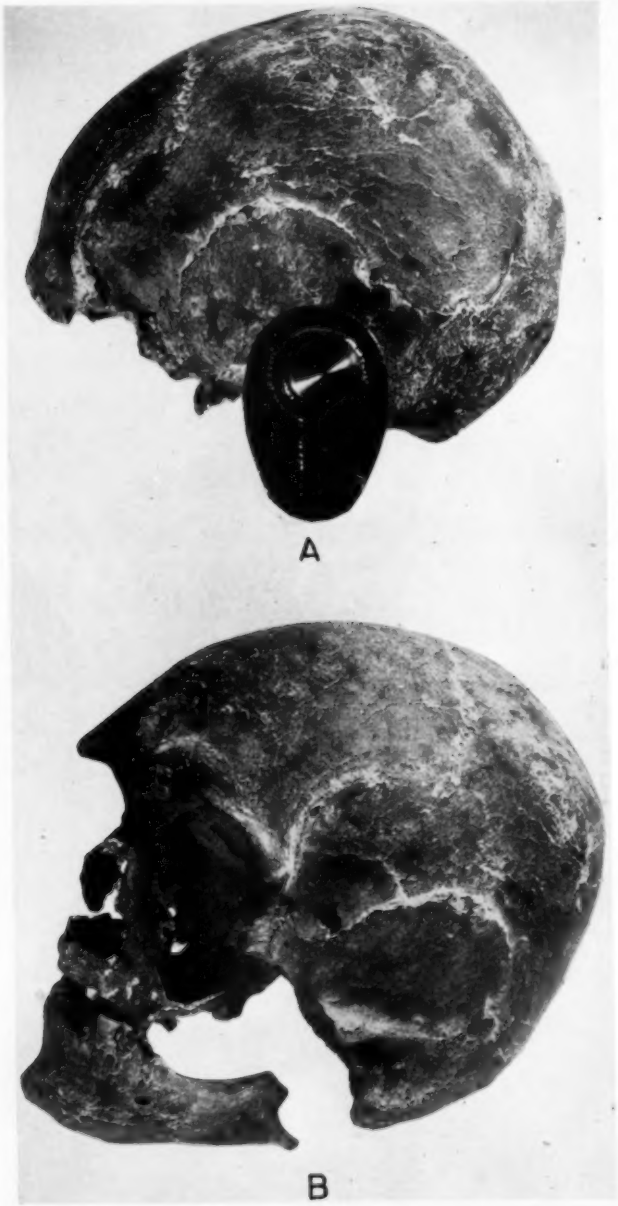
Nevertheless, at Tepexpan, the paleontological evidence provided an invaluable clue to the location of fossil human remains inasmuch as no less than five individual specimens of mammoth (*Archidiskodon imperator*) had been located at shallow depth below the dry lake plain. Two of these large creatures were excavated by Ing.

[1] Up to the time of writing (March, 1947) the site has has been visited by Dr. Alfonso Caso, Eduardo Noguera, I. Marquina, Dr. Rubin F. de la Borbolla, Ing. R. Manges Lopez, Ing. Teodoro Flores, Dr. I. Romero, Dr. Clarence Ross, and C. Fries of the U. S. Geological Survey, Dr. F. Weidenreich, Dr. Gordon T. Ekholm, Dr. Henry Field, Professor Cornelius Osgood, and Dr. Dale T. Stewart.

[2] Kirk Bryan, "Datos geológicos sobre la antiguedad del hombre en la Cuenca de Mexico," *Memorias del Segundo Congreso Mexicana de Ciencias Sociales*, Tomo 5, Mexico, 1946.



The fossil burial of Tapexpan, Mexico: A, skull in relation to the surrounding Becerra formation and the overlying deposits (length of tape, four feet); B, the skeletal remains after removal of the skull, whose original position is indicated by the hammer.



Skull from the fossil burial of Tepexpan, Mexico.

Arellano in 1946, one in association with a small obsidian flake. Previous to these excavations I had been able to identify three different beach levels of the prehistoric lake less than a mile distant from those mammoth finds. Hence my speculation that a herd of these creatures had walked, or been driven, into the swampy ground and that early man had somehow been involved in their extinction. Since the elephant bones lay some 50 inches below the lake flats underneath the caliche formation in late Becerra deposits, I considered this ground sufficiently promising for locating additional prehistoric remains by geophysical methods.

Dr. Paul Fejos, Director of Research of the Viking Fund, encouraged me to apply experimentally one of the geophysical methods and he suggested that Dr. Hans Lundberg, of Toronto, Canada, be entrusted with this task. A special grant from the Viking Fund enabled us to secure the necessary instruments and accessory equipment, the former having been furnished by Dr. Lundberg. While these preparations were under way, a topographic map was made by courtesy of the United States Geological Survey branch of the United States Embassy in Mexico City. Mr. Kenneth Segerstrom completed a most accurate map on a scale of 1:5,000, with one meter contours, prior to the beginning of our field work. This map was useful not only for my geological and subsequent archaeological work, but also for the plotting of equipotential lines which helped in guiding me to the exact spot where the fossil man was found.

Dr. Lundberg carried out his survey with the collaboration of Ing. de la O. Carreño and his assistants. The method used has been known since 1916 as the linear electrode method. It is the first time, to my knowledge, that it was applied for the detection of buried prehistoric remains. The question whether the electrical anomalies thus surveyed were caused by the fossilized human bones or by some other local hydrologic or mineralogic characteristics awaits further study. It is, however, evident, that without this detective device, it would have been impossible to locate the few square yards of ground excavated out of a total area of three million square yards.

LOCALITY AND POSITION OF THE FOSSIL

Tepexpan is a small village on the road which leads from Mexico City to Acolman and the pyramids of Teotihuacan. The locality lies 300 m. north of a culvert near kilometer stone 6 on the highway, or 900 m. west of the wall which surrounds the hospital for chronic diseases at Tepexpan. The flat lake plain is dry and dusty during the winter season and rises gently northwards to bluffs caused by a basalt lava flow which antedates the Upper Pleistocene. Along these bluffs lie two ancient lake shores, of which the lower (at 2,248 m.) represents the "Zacatenco beach," named after the locality where George C. Vaillant found it first. The higher (at 2,257–58 m.) "Becerra" beach is cut into Upper Pleistocene Becerra soils and is synchronous with the late Becerra substage to which the fossil man belongs. Traces of a still older shore line are found at 2,263 m. The difference in elevation between the Becerra beach (2,248 m.) and the upper limit of the fossiliferous Becerra clay in the excavation pit of the fossil man site is 17 m. This difference is due to progressive sinking of the lake basin for which adequate data are at hand.

The excavation was determined by a spot of high electrical resistance. The skeleton was found at a depth of 12–13 inches below the caliche formation which itself lies some 34 inches below the surface (Pl. VI, A). The sedimentary medium is a buff silty clay with freshwater shells and root canals, indicative of a swamp formation. A few inches below lies a diatomaceous sand. The mammoth remains, of which the nearest was found 1,000 feet distant, occurred in the same layer as the human fossil. The cut of the excavation showed no traces of intrusive burial nor any signs of subsequent disturbance. Root canals were found to penetrate the skull cavity undisturbed from the caliche on downward. The caliche, a fossil soil composed of calcareous and volcanic material, forms a hard layer 3–4 inches thick which seals off the Becerra sequence on top. The ceramic bearing strata with Aztec and older sherds lie on top of the caliche. These stratigraphic relationships are clearly exposed in road and drainage ditches in the immediate vicinity of the site.

The skeletal remains, skull, forearms, hands, and legbones, suggest that the body was embedded face downward with arms lying under the chest and the legs drawn up to the stomach (Pl. VI, B). In this position, the body must have sunk into the mud, leaving the shoulder, back and hips exposed. These parts of the body were largely missing, as were the feet, probably due

to scavenging action of animals. The position of the bones suggests accidental death. So far only two bird bones have been found in the immediate vicinity.

PHYSICAL ASPECTS OF THE FOSSIL

The bones were excavated in a wet silty clay and some of them were broken both in the excavation and during the drying and cleaning process in the laboratory. However, their restoration is possible especially since the original bone substance was largely replaced by mineralization. The color of the skull bones is dark grey to blackish on the surface and yellow-grey inside.

The skull itself appears to be mesocephalic though it is close to the brachycephalic type (Pl. VII). (The cranial index is 78.77.) The cranium is high at the vertex with strong but short supraorbital ridges. The condition of the sutures is such as to suggest a fully matured person. The dentition was incomplete during life time, and loss of cheek teeth and bone cavities suggest pathologic dental conditions. As Dr. Weidenreich indicates in the report which is appended to this article, the skull bears only a few features which might be called primitive, but ultimate judgment must be deferred until a complete restoration has been made.

The other bones, in conjunction with the skull, indicate that the person was of male sex. The right ulna exhibits a well-healed fracture.

TABLE 4. THE LATE GLACIAL AND RECENT HISTORY IN THE VALLEY OF MEXICO

Cultures	*Basin Sequence*	*Glacial Sequence on High Volcanos*	*Formations*	*Age*
Zacatenco II Zacatenco I	Zacatenco beach Low lake level	Recent moraines Regression of ice		First millenium B.C. ?
Chalco basalt industry (preceramic)	Totolzingo earth	Ayolopetito advance		Middle Recent
	Caliche (dry climate fossil soil)	Major ice regression		Early Recent (about 10,000 years ago)
Fossil man; gravers, stone and bone points	Yellow volcanic ash El Risco clay-sand and beach Fluvial gravels and bone beds Silt and bentonitic clay	*Trancas Advance*, terminal moraines at 3,400 m.	Becerra	
	Caliche	Ice retreat and erosion		Pleistocene
	Eolian loessic sands Brown sands and clays Tepetate (weathered pumice) fanglomerates	*Xopanó Advance*, terminal moraines at 3,200 m.	Tacubaya	
	Erosion Volcanic breccias and lava flows			

The position of the skeleton in the vicinity of several mammoths suggests that it belongs to a hunter who was either slain by one of his fellow men or mortally wounded while hunting. Unfortunately there are at present no clues to confirm either of these assumptions.

ARTIFACTS ASSOCIATED WITH THE BECERRA FORMATION

At present no direct association of material culture remains can be claimed, but artifacts had previously been found by me at several localities in fossiliferous Becerra deposits (Table 4). Also several fragments of dart points and waste flakes have been found at the top of the Becerra beach level some 1,000 yards dis-

tant from the skeleton. One of these fragments shows marginal pressure flaking with a broad and shallow center groove in the manner of the Folsom technique. These artifacts are made of a light grey mottled flint but there are others made of dull white chalcedony. The latter material seems to have been given preference over obsidian which occurs abundantly in the neighborhood. At Tequixquiac, a village some 20 miles distant from Tepexpan, a graver of chalcedony and a bone point were extracted by me from a bone bed. This industry, which I have called "San Juan culture" in a previous publication[3] must be considered roughly contemporary with the fossil man of Tepexpan. My first impression had been that it was not a Folsom culture but this view may have to be corrected as new material is being collected.

In general, it may be said that the picture gained so far from the Mexican finds confirms the theory of Man's existence in the late Ice Age of North America. Moreover, the association of fossil human remains with swamp deposits of a late upper Pleistocene lake wherein mammoths were trapped, would indicate that Early Man was partly responsible for the extinction of some of the large mammals whose remains appear in so many of the ancient basin fillings of Mexico.

APPENDIX

Through the kindness of the Viking Fund, Dr. Franz Weidenreich was able to visit Mexico and to form a preliminary opinion on the skeleton. His report follows.

The general character of the bones indicates that the individual belongs to the recent human type (*Homo sapiens*).

Although the skull does not reveal any special primitive feature characteristic of early hominids (the total calvarial height being about 140 mm., rather noteworthy considering the size of the skull) there are some structural peculiarities which are more primitive than those usually found in modern human skulls. The frontal and occipital superstructures are well developed. Both come very close to real torus formations. The frontal superstructure consists of a distinct eyebrow ridge on both sides. The ridge extends to the glabella region and turns downwards to the fronto-nasal suture forming a well-marked supranasal torus such as occurs in the Australian bushman of to-day and in other "primitive races." The supraorbital ridges proper show an advanced stage of disintegration, but the original character of the ridge is easily recognizable. The occipital bone exhibits a typical occipital torus which resembles even the condition found in Neanderthal skulls. Similar primitive features are recognizable at the nuchal planum, the mastoid and the parietal region (temporal line).

These primitive features are not restricted to the braincase. They occur also in the extremity bones in which they appear under the form of pronounced muscular tuberosities (deltoid tuberosity of the humerus, crista interossea, and crista musculi pronator quadratus of the radius).

The facial skeleton does not show any special primitive features. There is neither a general nor an alveolar prognathism. The teeth, so far as they are preserved, are those of modern man.

Regarding special racial characteristics, the present condition of the facial parts does not permit a definite diagnosis. The nasal bones are "pinched," a peculiarity frequently encountered in certain mongoloid types (Eskimo). The cheek bone, on the other hand, is small and does not project to a marked extent either forwards or sidewards. The crowns of the upper incisors are not preserved; hence it is impossible to recognize whether these teeth were shovel-shaped (Mongolian characteristic) or not.

The braincase has a particular form: the vertex region is pronouncedly domed without showing any indication of artificial deformation. This shape may help to determine the special group to which the skull must be attributed.

None of the bones is very robust; on the contrary they rather appear to be of a generally fine structure. Although this suggests female sex, the strongly developed muscular tuberosities prove that the individual was a male.

The tentative estimation of the cranial capacity is from 1,350 to 1,450 cc.

Taking all morphological facts into consideration, as far as it is possible to do so at this moment, it can be stated that none of them contradicts the possibility that the Tepexpan skeleton is that of an individual who lived at the end of the Pleistocene Period. All the skeletons of Upper Paleolithic man known from Europe, Asia, and Africa already show the features characteristic of recent mankind. In most cases really primitive characteristics are completely missing. Wherever features were found recalling primitive conditions, they show a more or less pronounced degree of disintegration as is the case with the Tepexpan man.

On account of the inconclusiveness of the anatomical character of the skeleton, its identification as one of Pleistocene age cannot be based on anatomical evidence alone. An important criterion in this respect is the degree of fossilization of the bones. All the bones of the Tepexpan skeleton are mineralized but the degree of mineralization varies: the lower jaw, for example, shows a higher degree than the brain case and the remaining facial bones. In the extremity bones, the mineralization led to a complete metamorphosis of the internal structure of the compacta such as is typical of human bones from the Middle Pleistocene of China and Java.

Therefore, I arrive at the following conclusion: If the stratigraphy of the Tepexpan skeleton proves the Pleistocene age, the anatomical character and the degree of its mineralization lends strong support to this assumption.

[3] Helmut de Terra, "New Evidence for the Antiquity of Early Man in Mexico," *Revista Mexicana de Estudios Antropológicos*, Vol. 8, pp. 69–88, Mexico, D.F., 1947.

Since the time of writing, Dr. T. Dale Stewart of the Smithsonian Institution has made a brief examination of the fossil in Mexico City. I regret that at this late hour it was not possible to include his report, which is of great interest inasmuch as he emphasizes certain affinities among the Tepexpan skull, the Lansing skull from Kansas, and another previously dredged from old deposits of the Missouri River. (Both of the latter are in the U. S. National Museum.) All three belong to a type which Hrdlička was wont to call "Algonkin," in that they are moderately long- and high-headed. Apart from establishing the geologic age at Tepexpan, the find appears to bear out Dixon's view as to the peripheral distribution of this skull type in North America.

In order to insure authentical reconstruction of the remains of Tepexpan men, Dr. J. Romero, Professor of Physical Anthropology at the University of Mexico, will bring the fossil to the Smithsonian Institution, which has most generously offered its facilities for cooperation.

Mexico, D.F.
March, 1947

THE INTERRELATION OF POPULATION, FOOD SUPPLY, AND BUILDING IN PRE-CONQUEST CENTRAL MEXICO

S. F. Cook

I

THIS paper is frankly exploratory, designed to test the possibility of applying historical and archaeological evidence to the solution of certain problems in demography and human ecology for which it is impossible to secure data of more conventional character.

The Central Mexican region was selected because it contained for a very long time perhaps the densest population on the North American continent and because the annalistic as well as archaeological information concerning it is remarkably copious. Specifically the area is defined for present purposes as that included in the present states of Vera Cruz, Hidalgo, Tlaxcala, Puebla, Mexico, Federal District, Morelos, Oaxaca, Michoacan, and Guerrero. This territory is not an ethnic or economic entity since it includes both coastal and highland cultures together with numerous independent linguistic stocks. On the other hand it corresponds to the most intensive area of archaeological investigation outside of Yucatan and is more or less coterminous with the so-called "Aztec Empire" as the latter existed in 1520.

II

The lowest archaeological horizons lie at the base of what are variously designated the archaic culture and the Middle cultures. These are represented by the Zacatenco and San Angel horizons in the Valley of Mexico, and Monte Alban I and Tres Zapotes I in Oaxaca and Vera Cruz. The dating of this period is subject to controversy but appears to lie somewhere in the first centuries B.C. Previously there existed what Vaillant and others have called the Early cultures, or which might also be termed the pre-Archaic.

It is generally considered that during the latter epoch, which must have been of very long, although of unknown duration, the country was inhabited by nomadic tribes, or at least by hunting-gathering groups. Concerning their identity, location, and particularly numbers, we have no direct evidence whatever. It is possible however, to make certain inferences by analogy which will at least provide us with a starting point for comparison with subsequent cultures.

Even allowing for a certain amount of arid land the Central Mexican environment cannot have been profoundly different from that of the nondesert portions of California prior to white occupancy. The hill and plateau country still strongly resembles the foothill and valley regions of California, whereas the coastal tropics, although superficially unlike the middle Pacific area, resemble it quantitatively with respect to food supply. It may be concluded that since the ecological status of the two regions was at least not widely at variance, somewhere near the same population density may have prevailed before the appearance of agriculture.

Through the exhaustive investigations of Kroeber (1921) supplemented by my own studies (1943) we know that the aboriginal population of California, exclusive of desert was very close to 133,500. The area involved was 110,330 square miles and the mean density 1.21 per square mile. The Mexican area under consideration includes 143,985 square miles. Using the same density factor the population, when a similar type of culture prevailed, would have been approximately 175,000. If it be held that the greater density in the tropics should be allowed for, we can use the factor for the north coast California tribes, 2.1 persons per square mile. This gives 302,000 for Central Mexico. Without attempting to secure an exact value it may be stated that comparison with California indicates a pre-Archaic population for Central Mexico of 150,000–250,000, say 200,000 as a working estimate.

III

The transition from a strictly hunting-gathering to a sedentary economy coincided with the introduction or development of corn as the basic dietary staple. That this evolution must have occurred sometime toward the end of the Early and the beginning of the Middle period, is supported by reasonably sound evidence. In the first place no artifacts such as figurines, pottery, or religious structures are likely to be found unless the producing civilization is sufficiently settled to remain in one locality for a

considerable period of time. This in turn requires an adequate and a predictable food supply, together with periods of leisure, at least for some of the population. The primary crop food fulfilling the necessary requirements in Middle America was corn.

In the second place the importance of corn during the Middle Period is attested by the material remains. Numerous grinding implements, principally *metates* and *manos*, have been reported by Beyer (1921) at San Angel in the Valley of Mexico and Rancho Colorado in Puebla, by Gamio (1929) under the lava at San Angel, by Gamio (1922) at Teotihuacan, by Drucker (1943) at Tres Zapotes in Vera Cruz, by Vaillant (1930) at Zacatenco, by Leon (1903) in Michoacan. Stylistically somewhat primitive, they are entirely usable for grinding corn. Indeed, Vaillant (1941) feels that their presence proves "that the people relied on corn as their principal food." Finally actual pieces of charred corn cobs have also been found (Lozano, 1925; Vaillant, 1941), although the condition of the fragments was such that the type of corn and hence its exact nutritional value could not be determined.

Corn was very early supplemented by beans. Nicolas Leon (1903) in his work on the Tarascans states that the "primitivos pobladores" who very probably extended as far back as the Archaic period "sembraban maiz, chile, frijol . . . y fabricaban pulque." According to Palacios (1937), the Middle cultures generally represent the first agricultural horizon, during which in addition to corn there were introduced "frijol, cacao, semillas y frutas." At exactly what stage these were introduced is of course conjectural, but it is safe to say that by the beginning of the Teotihuacan cycle there were available all the chief vegetable components of later and even modern diets: corn, beans, wild seeds, fruits, chile, and pulque. A rapidly expanding variety of staple foods is therefore indicated during the progress of the Middle period. Simultaneously, even with virgin soil tillage and exceedingly crude ploughing and reaping methods, the total available bulk must have been augmented manyfold.

Certain items, however, are qualitatively important, two in particular: vitamins and protein. If the inhabitants generally received a full ration of corn, beans, whole wild seeds, fruit, and pulque, they probably were adequately cared for with respect to vitamins, although the margin between adequacy and at least subclinical deficiency must have been dangerously narrow. The question of protein is serious. Linton (1940) holds that it is the protein level, not the total bulk or calorific level which limits the growth of populations. He then states that the vegetable foods of the Middle Americas were as a whole low in protein. But he fails to differentiate between animal protein of high biological value and vegetable protein of low biological value. As to pure quantity, 500 grams each of corn and beans can easily supply 100 grams of protein, a great sufficiency were it not for the high energy cost of utilization and the lack of essential amino acids. On the other hand a relatively small amount of animal protein can so supplement the vegetable as to render the diet quite suitable for maintenance and even growth. It is often taken for granted that the early inhabitants secured no food beyond the staple crops mentioned. This assumption is scarcely warranted. The people of the Archaic period and their successors, were not distantly removed from hunting-gathering, and the latter consumed every animal they could catch. Repeated reference is made by writers on the Nahua civilization to the many unaesthetic and unappetizing items in the native dietary, such as worms, reptiles, insects, pond scum, and the like. The function of such materials is quite clear—to supply animal protein, together with additional vitamins. With respect to both quantity and quality, this source of food was by no means negligible.

Game, in the sense of wild mammals, was obtainable even into colonial times, and at an earlier period was probably quite abundant. Reptiles and amphibia were always numerous. Birds swarmed wherever there were inland lakes. Vaillant (1930) found a considerable number of animal bones in the refuse heaps at Zacatenco and postulates therefrom "a considerable consumption of the flesh of birds and deer." It is noteworthy that the most highly developed cultures (with the exception of the Zapotec) were either lacustrine or coastal. The prodigious influence of the lake in the Valley of Mexico cannot be overestimated. Noguera (1931) emphasizes the importance of Lake Patzcuaro in the latter phases of Tarascan culture. He considers that there was a series of lakes in Michoacan and that the population centers were built around them. Staub (1919) and others have shown that the most densely populated portion of the Huasteca in prehistoric times was the shores of creeks and lagoons

in the Panuco-Topila district, waters which furnished good sources of animal protein in the form of fish, waterfowl, and amphibia. The great shell deposits mentioned by Ekholm (1944) are proof that the coastal tribes made heavy use of clams, oysters, and crabs, and it can indeed be shown that this source alone was sufficient to maintain a very large population.

Another factor of importance was trade. The commerce of the Aztecs and their associates in the Valley of Mexico has been the subject of comment since the days of Sahagun. Students of ceramics and buildings have repeatedly pointed out how artistic styles were influenced by ideas brought in from the exterior, even in the earliest known horizons. It is wholly unlikely that intertribal or inter-regional contact would produce such striking results in the aesthetic field without interchange of material commodities on the dietary level as well. Items of high nutritional value and small bulk would have been specially well adapted to such commerce. Cocoa is a good example. Linné (1934) stresses that his excavations near Teotihuacan brought to light the shells of numerous molluscs, mostly from the Pacific Coast. The inhabitants showed "great interest in these animals for decorative purposes." However, it is quite conceivable that the meat, as well as the shell, was sent to the interior in a manner analogous to that employed by the California Indians many centuries ago. On the whole we may hazard the statement that the supply of animal protein was greater than has been supposed, and that it did not constitute a serious limitation on the growth and maintenance of population.

The striking and abrupt appearance in the early Middle period of advanced material artifacts points to the existence of a moderately well developed culture. Accompanying or even preceding the development of this culture was the establishment of a primitive agriculture throughout Central Mexico which furnished support for a very much larger number of people than did hunting and gathering. In the initial stages much reliance was doubtless placed upon the older form of subsistence, but as the period progressed the newer methods must have come to predominance, at least to the extent of permitting some attention to the domestic arts and religious architecture. Simultaneously the population must have undergone a progressive increase of considerable magnitude. It will not be too radical to suggest the ratio of increase at five to one. Accordingly, if we admit a population of 200,000 for the Early period, that at the end of the Middle period for the entire area may have reached 1,000,000.

According to the archaeological data there was no very sudden break between the Archaic and the Teotihuacan periods. Indeed, as has been mentioned, there has even been described in the Valley of Mexico a definite overlap, as if the older and newer forms existed for a whole period side by side. This is in conformity with the probability that the agricultural base upon which all these social organisms rested did not alter in character but at the most merely expanded. Leaving aside the purely cultural differences for which ceramic styles are testimony, it appears that the general economic level rose steadily through the Middle cultures well into the Teotihuacan period. By the latter epoch sufficient material resources, particularly with respect to food and shelter (and perhaps military security), had accumulated to make possible the construction of very elaborate and pretentious public works of a religious and ceremonial nature. In order to divert so much manpower and material resources to such purposes a very considerable population was necessary. I believe, therefore, that an expanding agriculture was followed by increase in population which always crowded the subsistence level and which reached its maximum in the great building period. To allow for this final increase a purely tentative figure of 2,500,000 may be assigned for the entire area at this time.

The later phases at Teotihuacan and Monte Alban under the Zapotecs are characterized generally by some artistic decadence in ceramics and the cessation of heavy construction at the established sites. It may be inferred that the primitive agriculture had now reached its limit of expansion and had actually suffered retrogression in certain regions. Under these circumstances the population would stabilize at such a level that the margin between adequacy of subsistence and actual famine would be very narrow. Moreover, even this margin may well have been nearly if not completely wiped out by the exhaustion of economic reserves through an over-extended construction program. An actual population decline is indicated at the long-established centers such as Teotihuacan itself, and in any case a weakening of the older social structure. Inevitably the existing tribes became less and less able to resist the pressure of external assault and ultimately gave way. Replacing them and absorbing their culture

were those peoples known vaguely as Chichimecs, the earlier representatives of whom included probably the historical or dynastic Toltecs. This tribe flourished and went through a relatively brief but brilliant cycle of culture and building at Tula during the Mazapan or early Mixteca-Puebla period. Perhaps at more or less the same time the somewhat decadent Zapotec culture was replaced in central Oaxaca by the Mixtecs, who supported a renewal of artistic effort and building at Monte Alban and at Mitla.

The evidence for the existence of processes which, toward the end of the Teotihuacan period, tended to restrict or reduce food supply, is highly significant, although somewhat scanty. Linton (1940) suggests that soil exhaustion may have been important in the older, heavily populated communities, for example in the valleys of Mexico and Oaxaca. The long cultural sequences at certain restricted sites such as Teotihuacan, Cholula, Xochicalço, Tres Zapotes, and Monte Alban would imply a local population of some magnitude which would depend upon the adjacent territory for crops. In the course of centuries intensive use would naturally induce soil deterioration. But on the other hand solid cultural tradition would militate against the removal to a new and virgin territory. The local civilization would tend to remain static at the cost of less and less efficient food production until starvation forced down the numbers, or the weakened people were overwhelmed by more powerful neighbors.

The ecological status of the plateau country and central Oaxaca very probably underwent considerable change in this era. It is not coincidence that such magnificant ruins as Teotihuacan and Mitla are located in what is now arid or almost desert country. The builders can scarcely have selected such sites even for ceremonial centers in preference to better watered, more fertile ones not too far away. That some alteration occurred is indicated in various ways. From the relative scarcity of stone axes at Teotihuacan, Linné (1934) deduces a lack of heavy forests at the time of this culture. However, Vaillant (1941) points out quite pertinently that tremendous quantities of wood had to be consumed in order to reduce limestone for the cement used in the pyramids and temples. From the weight needed to reduce a unit mass of calcium carbonate it can be calculated that thousands of tons of wood must have been sacrificed. Hence deforestation on a significant scale must have occurred. Erosion would follow, with its well known train of consequences for agriculture and wild food supply.

Another possible bit of evidence pertains to the lake levels. Vaillant (1935, 1938) attempted to correlate changes in the depth of Lake Tezcoco with culture sequences but without much success. He did, however, demonstrate clearly in the hills around Guadalupe that wide fluctuations in the lake level have occurred, some of which may indicate soil and erosional rather than truly climatic alterations. Noguera (1931) was able to show that in Michoacan, populations followed lakes. The earliest was at Zamora and the next at Zacapu. The lakes at these points have now disappeared and the populations with them. Most recent is Lake Patzcuaro which is still in existence and is heavily inhabited. An interesting study was made in the latter region by Deevey (1944) using the new method of pollen analysis. A change from a wet to a relatively dry climate at a remote period was clearly demonstrated together with a drastic realignment in the floral associations. Although this particular change may have been too remote to apply to conditions during the centuries immediately preceding the Spanish conquest, it is highly suggestive in indicating the possibility of material shifts in ecological balance during more recent periods.

Finally the annalists (such as Ixtlilxochitl, Tezozomoc, Annales de Quautitlan) refer to the downfall of "Tollan" in terms of crop failure and famine as well as of religious conflict and war. The tradition upon which their accounts were based no doubt pertained to the decline of Tula, rather than of Teotihuacan, but nevertheless must have its inception in a long-term tendency which was evident even at the time of the abandonment of Teotihuacan itself.

The exhaustion of agriculture was no doubt felt most severely in the highlands but also may have adversely affected the civilizations on the Atlantic coastal strip despite the lower susceptibility to erosion and the greater recuperative power of the tropics. We have little or no direct proof to this effect, but suggestive is the disappearance of the early civilizations at Tres Zapotes (Drucker, 1943) and La Venta and the withdrawal of the Huastecan peoples from the higher ground of San Luis Potosí (Ekholm, 1944). During this intermediate period of retrogression and readjustment it is possible that

the demographic condition of Michoacan and the coasts remained more or less stable. But the decline of the high cultures of Monte Alban, Cholula, and Teotihuacan, the abandonment of great religious centers, and above all the unanimous statements of the annalists, speak for a definite decline on the plateau. The legend of the destruction or expulsion of the "Toltecs," the description of the empty wastes encountered by the Nahua invaders, surely must have a remote but unequivocal factual basis. If we conceded a previous peak of 2,500,000 people for Central Mexico from coast to coast, then in subsequent centuries it may have fallen to 2,000,000 or even possibly the hypothetical archaic level of 1,000,000.

As they arrived, the successive waves of newcomers gradually assimilated the culture they found—or were assimilated by it. Finally some degree of stabilization was achieved under the dominance of the later Nahua tribes, permitting them to consolidate, economically and politically. Meanwhile, it is likely that some degree of soil and forest restoration was effected, thus permitting a recrudescence of agriculture. Assisting in this process were certain new dietary and agricultural techniques coupled with a very active commerce. Among the former were three of outstanding significance. The first was the control of water supplies for both domestic use and irrigation. This, as much as anything, made possible intensive urbanization. The second was the "chinampa," a device for making land in a lacustrine habitat which had been known among the Middle cultures (Apenes, 1943; Noguera, 1943) but which was brought to a very high state of perfection in the Aztec period. Due to the "chinampa" a highly specialized vegetable truck garden system was evolved. The third was the tortilla, evidently invented during the intermediate period (Leon, 1903; Linné, 1934). By virtue of its ease of preparation, compact form, long-keeping quality, and ready portability, the tortilla became the basic ration of the Central Mexican armies and is perhaps the key to their tremendous endurance in distant and long protracted military campaigns.

Under Aztec and Tezcocan leadership in agriculture and commerce, the entire economic level rose rapidly carrying with it the available food supply and unquestionably the population. It is a safe assumption that the latter attained its previous maximum, say 2,500,000, and reached a far higher figure before it was cut down again by the Spanish conquest. To evaluate the exact situation in the last two centuries prior to 1520 will require special investigation, which is reserved for the future.

IV

Since even the days of Cortes all visitors have been impressed by the size and majesty of the great Mexican ruins, Teotihuacan, Monte Alban, Mitla, Tajin, and Cholula. Many students have felt that in these material remains lay a clue to the size and power of the peoples who constructed them, and yet few, if any, have made a serious effort to utilize this particular type of objective data.

There can be no question that the ponderous edifices constructed in Central Mexico were ceremonial and religious in character. In other words they satisfied the aesthetic and emotional urge of the people, but instead of contributing in any way to their material welfare they constituted a drain upon all the tangible resources of the tribe. Since the economy was almost exclusively agricultural, based on corn and available wild foods, the subsistence level, and hence in the long run the population, was determined and limited by the corn production. However, as suggested previously, in the middle of the first millennium A. D. the agriculture appears to have somewhat outstripped population. As a result there was generated an excess productive capacity such that, while the group as a whole remained at the strict level of bare necessity, certain members could be spared from the active pursuit of food production and their energies devoted to the erection of religious centers. If, now, in any way we could correlate the magnitude of building construction with the labor and food supply, we might be able to deduce the approximate population. For this purpose it appears most satisfactory to concentrate our effort upon the period lying between the end of the Middle times and the beginning of what Mason has called the Mixteca-Puebla period, i.e., the period of Independent Cultures. During this era were constructed some of the most extensive and at the same time most thoroughly studied building complexes, although it will be freely conceded that later centuries saw the completion of numerous important enterprises, such as that at Tula.

Such an enterprise as the Pyramid of the Sun at Teotihuacan, together with the subsidiary structures which were being erected at the time, must have absorbed the energy of the

population within a wide radius. Let us assume that the territory included everything within a long day's foot journey of the site, perhaps 50 kilometers with a total area of 8,000 square kilometers. At any one time, during the active construction of a pyramid of such magnitude, the number of laborers must have approached 3,000, particularly if we include those who were engaged in digging dirt, cutting stones, and the like in preparation for the direct use of these materials. In addition there must have been an equal number of laborers and artisans working on other buildings or indirectly contributing to the construction of the pyramid itself. At the same time Teotihuacan was a going concern, carrying on its functions as not only a great religious but a political center. Numerous priests, assistants, nobles, chiefs, and other members of the ruling class, together with their retinue of servants and probably slaves, had to be supported by the people at large. It will not be excessive to estimate this group at 2,500. Finally there were the dependents of the former groups, wives, children, and aged relatives, who had to be carried by the general organization. They must have been at least as numerous as those actually participating. The total then would be 17,000.

According to the principle of economic surplus only the food production over and above the maintenance level of the entire supporting population could be devoted to those engaged in political or religious enterprise, otherwise starvation would collapse the entire system. The question then becomes: what number of people were necessary to produce an excess of food, in corn or its equivalent, sufficient for 17,000 persons? We might make an arbitrary guess that the productive population had to be ten times greater than the non-productive, which would yield 170,000, plus 17,000 or 187,000. However, there is still another method of estimate which may be more accurate, based on the energy requirement of the diet.

Nutritionists today hold without exception that a daily intake of at least 3,500 calories is necessary for an adult who is leading more than a very sedentary life, whereas the need of a laborer is much greater. Yet it has been shown, for example by Gamio (1922) and Llamas (1933), that in modern rural Mexico the average value of the diet is no more than 2,000 calories per day. There is good reason to wonder whether the prehistoric dietary status may not have been better than it is today, and it certainly must have been as good. It is therefore necessary to ascribe a minimum of 2,000 calories for the average individual in Teotihuacan times. In view of the extraordinary ability demonstrated by the tribe, and the clear evidence of their drive and power, it is probably better to raise this value to 2,500 at least.

The energy value of "corn," as given by Rose (1938), is 285 calories per 100 grams or 2,500 for 712 grams. This is only an approximation since the varieties of corn differ in value and we do not know the exact properties of that used by the Teotihuacan people, but it is within the correct order of magnitude. Furthermore, we have to compute the entire prehistoric diet in terms of corn, although other types of food were eaten as well. The corn requirement of the 17,000 non-productive persons was then 12,100 kilograms per day, or 4,420 metric tons per year.

It is impossible to state, naturally, just what was the agricultural surplus available for this group. In late Aztec times, however, when the social order was at a high level of organization and agricultural methods better developed, probably somewhere near one third of the total food production went (in the form of tribute) to the ruling caste. An allowance of one fifth, therefore, seems liberal for Teotihuacan. This means an effective food production, as corn, of 22,100 metric tons. If we add 20 per cent for seed and spoilage, we get 26,500 tons. In English units this is 1,035,000 bushels. Since the mean weight of shelled corn is nearly 56 pounds per bushel and a fair, but not outstanding, production is 40 bushels per acre, we find that the land under cultivation must have been somewhere near 25,800 acres. Under the very primitive conditions existing at the time it is doubtful whether one family unit could successfully cultivate more than one acre. In modern Mexico it often cultivates much less. At the rate of six persons per family this means 155,000 persons, and together with the 17,000 non-productive citizens makes a total of 173,000.

These calculations are admittedly speculative, although based on the best probability, and cannot be taken too literally. Nevertheless the evidence appears good that at least 150,000 persons constituted the religious and cultural unit at Teotihuacan during its period of greatest glory.

Monte Alban was a tremendous establishment. Its buildings alone covered 40 square kilometers (Caso, 1941), as compared to 18 at

Teotihuacan. Caso thinks it was surrounded by numerous towns in which the producing population actually lived. The size suggests a supporting radius twice that of Teotihuacan, an area of 31,400 square kilometers, and an official staff of roughly 25,000, including laborers, slaves, and dependents. The total population may, therefore, have been as high as 250,000.

At Cholula the pyramid contains 1,800,000 cubic meters of earth and stone (Lehmann, 1933), as compared with 993,000 for the Pyramid of the Sun at Teotihuacan. On the other hand there are few remains of other buildings, and furthermore this pyramid was built by several superpositions over a very long period of time. On the whole it will be liberal to assign this religious center an area of 4,000 square kilometers and a population of 75,000 persons.

The Michoacan or Tarascan region is of different character. Here are found small burial mounds (*ydcatas*) of variable size but few really large constructions except the level platforms on which the mounds were placed. The mounds, however, are so very numerous (Leon, 1903; Lumholtz, 1902; Caso, 1930) as to represent an amount of labor and upkeep comparable to that of Teotihuacan. In an area of perhaps 20,000 square kilometers centering around Lake Patzcuaro we may then assume a population of 150,000.

Other sites may be mentioned as appropriate to similar analysis, such as the recently uncovered building complex at Tula, other localities in northern Mexico and northern Morelos, and the extensive centers in coastal Vera Cruz excavated by Drucker and by Ekholm. Most of these, however, pertain to post-Teotihuacan time and moreover, merit a more careful and detailed consideration than is possible within the scope of the present paper.

The population densities for the four sites or centers discussed are respectively 18.8, 8.0, 18.8, and 7.5 persons per square kilometer. Collectively the value is 13.3. Since these were the most advanced regions culturally, the intervening territory must have been more sparsely populated, say with one half the density or 6.7 persons per square kilometer. Then, since the area was 310,000 square kilometers, the population would have been 2,075,000. Together with the 625,000 from the four centers mentioned the total would reach 2,700,000, a value greater than the 2,500,000 suggested previously for the period and perhaps too high, but well within the same range. A more detailed study of sites, buildings, and chronology would no doubt provide a much closer approximation.

SUMMARY

The thesis is advanced that the preconquest population of Central Mexico was dependent primarily on food supply. The latter, prior to the Middle cultures, was on the hunting-gathering level and may have supported 200,000 persons. During the Middle and early Teotihuacan periods the development of agriculture, founded on corn and beans and supplemented by wild animal sources, permitted an increase to at least 2,500,000. That this estimate is not too low is indicated by calculations based on the probable economic surplus needed to support the building programs of Teotihuacan and elsewhere. Erosion, deforestation, and possibly soil exhaustion then forced a decline. Recovery occurred after an interval of rehabilitation and infusion of new races. This recovery, aided by more elaborate technical methods, made possible further growth of the population up to the time of the Conquest.

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YUCATECAN CHRONOLOGICAL SYSTEMS

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THE natives of Yucatan employed successively three different chronological systems that had Maya nomenclature. These systems will be designated in the order of their appearance: the old Maya calendar, distinguished by a long count; the Mexicanized calendar, distinguished by a shift in the month coefficients; and the Europeanized calendar, distinguished by the fixation of 10 Chen on January 1 and of 1 Pop on July 16.

The old Maya calendar is a system with an ascending order of units based on twenty, except the *tun* where eighteen is used. The value of each order is expressed by a coefficient that may range from zero to nineteen, excepting the *uinal* where the range is from zero to seventeen.

An inscription at Chichen Itza, 10.2.9.1.9, 9 Muluc 7 Zac, will serve to exemplify how the long count operated.

10 baktun	144,000×10	1,440,000 days
2 katun	7,200× 2	14,400 days
9 tun	360× 9	3,240 days
1 uinal	20× 1	20 days
9 kin		9 days
		1,457,669 days
		or 3,991 years

When 1,457,669 days are counted forward from a zero or starting point, 4 Ahau 8 Cumhu—3,991 years in the past, the inscribed date, 9 Muluc 7 Zac, is reached.

In the formation of the large number 1,457,669, the Mayas employed five ascending units, which sufficed for ordinary needs. For purposes of computation, Maya mathematicians evolved, by using 20 as a base, additional units of an ascending order. On a stela at Tikal, as Morley[1] was the first to point out, is carved a Maya number of eight units, 1.11.19.9.3.6.2.0. This Maya number equals 1,841,639,800 days, approximately five million years. With their method of counting, the Mayas could handle numbers of astronomical proportions.

The inscribed date, 10.2.9.1.9, 9 Muluc 7 Zac, will not recur in full until 2.7.9.10.2.9.1.9. The interval between the two occurrences of the date is 2.7.9.0.0.0.0.0, which will be diagrammed:

2×	1,152,000,000	2,304,000,000 days
7×	57,600,000	403,200,000 days
9×	2,800,000	25,920,000 days
		2,733,120,000 days
		or 7,482,875 years

Maya mathematicians not only understood but may have derived independently the concept of zero—a concept which ranks among the greatest achievements of the intellect. No real concept of zero was possessed by the ancient Egyptians, Babylonians, Assyrians, Greeks, or Romans; nor by Europeans until Arabs borrowed the zero concept from India and introduced it to Europe in the twelfth century. A zero concept is all-important for fixing position values as may be seen from our Arabic method of counting by tens.

The date on a lateral part of the Caracol stela at Chichen Itza is read: 17 tun, 10 baktun, 3 katun. This is an abbreviated form of 10.3.17.0.0, and as such would not recur for 7,482,875 years.

A *haab* is a counter of 365 days, or 1.0.5 in Maya notation. It exceeds by five days the *tun* unit, 1.0.0 of the long count. Fifty-two *haabs* constitute a calendar round, in Maya terms 2.12.13.0. A calendar round contains 18,980 different dates, after which the dates repeat in sequence. *Haabs* and calendar rounds were counters commonly used by Nahua or pre-Conquest Mexican people, who had no long count.

A calendar round date without a clearly defined long count position can repeat 10 times in 520 vague years. When the calendar round date is defined by a positional determinant, its place in the Maya long count is fixed for a considerable length of time. There are inscriptions at Chichen Itza that record some safely deciphered calendar round dates with positional determinants definitely fixing the dates in the long count, thus:

10.2. 4. 8.12,3 Eb 10 Pop, 5 Tun 1 Ahau
10.2.10.11. 7,8 Manik 15 Uo, 11 Tun 1 Ahau
10.2.12. 1. 8,9 Lamat 11 Yax, 13 Tun 1 Ahau

[1] Morley, 1915, p. 116.

Since the *uinal* coefficient in each of the given cases is less than 13, the long count position of each date is fixed for 360 calendar rounds, or 18,707 years. Another calendar round date, 7 Akbal 1 Chen, with a positional determinant, 1 Tun 1 Ahau, will occupy the long count position 10.2.0.15.3, 7 Akbal 1 Chen, in 1 tun of katun 1 ahau; but in this case the *uinal* coefficient is more than 13, therefore the defined date is fixed in the long count for only 143 calendar rounds, or 7,431 years. In brief, calendar round dates with positional determinants are fixed for more than seven thousand years.

Taken by itself a positional determinant will repeat at intervals of 13 *katuns* or 256 years. On the front of Lintel III of the Temple of the Three Lintels at Chichen Itza is a positional determinant 10 Tun 1 Ahau, which can repeat as follows:

9. 9.10.0.0	10 tun of katun 1 Ahau
10. 2.10.0.0	10 tun of katun 1 Ahau
10.15.10.0.0	10 tun of katun 1 Ahau
11. 8.10.0.0	10 tun of katun 1 Ahau

These four alternative long counts may be narrowed to a single choice. The front of Lintel III has eighteen glyphs in two rows of nine glyphs each, and on the front of the Initial Series lintel can be seen the same number of glyphs similarly arranged. The glyphs representing 10 Tun 1 Ahau, towards the beginning of each inscription are practically identical in design. Accordingly, the long count position of 10 Tun 1 Ahau recorded on each lintel is the same 10.2.10.0.0, 10 tun of Katun 1 Ahau. The accurately fixed dedicatory date on the front of the Initial Series lintel, 10.2.10.0.0, may be utilized as such in any chronological investigations.[2]

All safely deciphered inscription dates at Chichen Itza are baktun 10 dates. For convenience, a *baktun* is designated by its coefficient. The latest authentic inscription date at Chichen Itza is recorded on the Caracol stela, 10.3.17.0.0.

The latest reliable inscription date found anywhere in the Maya area is incised on a jade gorget at Tzibanche. It consists of only three glyphs which clearly read: 12 Ahau, *u katunil*, end 4 Katun. Were the first part of the date, Katun 12 Ahau, taken alone it could repeat at intervals of 13 *katuns*, or 256 years thus: 9.11.0.0.0; 10.4.0.0.0; 10.17.0.0.0; 11.10.0.0.0; etc. Were the last part of the date, end 4 Katun, taken alone it could repeat at intervals of a *baktun*, or 394 years, thus: 8.4.0.0.0; 9.4.0.0.0; 10.4.0.0.0; 11.4.0.0.0; etc. The date in its entirety—12 Ahau, the Katun, end 4 Katun—will occupy only one long count position for a period of 374,144 years, namely, 10.4.0.0.0, 12 Ahau 3 Uo.

Some calculations higher than 10.4.0.0.0 appear in the Codex Dresdensis which is a compilation of magical rites, mystical numbers, astrological schematisms, and occult prophecies. A citation from Morley[3] in part reads: "The 6 Baktun 10 I.S. from the Codex Dresdensis are marked 'P' in the third column of table 119, since all of them were probably 'prophetic,' *i.e.*, still in the future at the time they were first calculated." The Dresden Codex is an astrological manuscript that lies outside the province of this paper.

At Chichen Itza, the architecture reveals distinctive foreign features, including the serpent motif that inspired the titles: *the feathered serpent's city*[4] and the *people of the serpent*.[5] The cult of the feathered serpent, Quetzalcoatl, was brought to Yucatan by Mexican warriors.

Quetzalcoatl is sometimes represented by a serpent with a human head within its open jaws. Lintel IV of the Temple of the Four lintels at Chichen Itza and Lintel II of a small temple at Yula, "both have the same figure of a serpent carved upon them, with a human head issuing from the gaping mouth; the two pairs being practically identical in design."[6] The two temples manifestly are Maya-Mexican structures.

Architectural features that characterize the Maya-Mexican era are: "Serpent columns, anthropomorphic and zoomorphic Atlantean columns . . . battered wall bases, roof crests, serpent balustrades, Chac Mool figures, Atlantean figures, Tlaloc *incensarios*."[7] Anthropomorphic Atlantean columns and other architectural features place the Temple of the Initial Series in the Maya-Mexican category.

There are close architectural affinities between the renamed Temple of the Three Lintels —formerly called the Temple of the Two Lintels—and the Monjas group at Chichen Itza. "Indeed, it is not overstating the case to say that the stylistic affinities between this temple and the Monjas Group are closer than

[2] Morley, 1927, p. 234.

[3] Morley, 1938, Vol. 4, p. 276.

[4] Marden, 1936, title page.

[5] Thompson, 1932, title page.

[6] Morley, 1925, p. 250.

[7] Morley, 1931, p. 107.

are the stylistic affinities of either to any third building or group of buildings in the city. *A priori* this would indicate that they both probably date from approximately the same period."[8] They date from the same Maya-Mexican era.

The group of the Temple of the Wall Panels at Chichen Itza is Maya-Mexican, as evidenced by such features as "the battered basal zone, colonnade, roof crests, serpent columns and the feathered serpent and sun disk motifs in the sculptured panels."[9] On the tail of a serpent column belonging to the Temple is carved a time count that falls in the Maya-Mexican period.

Among Mexican features of the Caracol at Chichen Itza are serpent balustrades, roof crests, and Tlaloc *incensarios*.[10] The round tower—not decorative but structural in function—is very distinctive of the Quetzalcoatl cult.[11] A serpent hieroglyphic band was above the medial cornice of the round tower, and a stela with a permanent serpent border was shrined in a niche between the two divisions of the upper stairway. Undoubtedly the Caracol was a Maya-Mexican structure.

All structures at Chichen Itza that have decipherable time counts, belong to the Maya-Mexican era. No chronological inscriptions associated with structures in the northern section of the city have been published. Chichen Itza, incidentally, was occupied right up into Spanish times.[12]

This review of Maya-Mexican architecture in connection with inscriptions has prepared the way for considering Mexican influence on the calendar. The mental attitude of Mayas in counting time differed from that of Mexicans—the difference between thinking in terms of elapsed time and thinking in terms of current time. All units of the Maya long count were ending units, whereas the principal Mexican counter was a *haab* with a year-bearer having a beginning date. Not only were there different mental attitudes, but the *haab* of 365 days conformed better to seasonal requirements than a *tun* of 360 days. Consequently, the 365-day *haab* of current time would find favor with the masses, while conservatives would cling to the old units of elapsed time. In this unequal contest, the Mexican method of counting current time prevailed.

After the ending of Katun 12 Ahau 3 Uo, a Mexicanized calendar, identifiable by means of a shift in the month-coefficients, came into general use. It is uncertain when the change took place, but the fact that there was a shift of 18,980 month-coefficients in a calendar round is sufficient proof of a radical change.

Calendrical shifts for adequate cause are not unusual. The Gregorian reform of 1582 was a forward shift of ten days. England in 1752–53 shifted the commencement of the year from the 25th of March to the 1st of January. An account of how the shift in the coefficients of Maya months may have come about will be presented.

The old Maya calendar measured elapsed time; the new Yucatecan calendar measured current time. Transition from the old to the new could have been effected by use of a simple transformation coordinate. As an illustration, a selected *katun* ending date, 10 Ahau 8 Muan, with a comparative Julian date, May 18, 1448, will be transformed into a *katun* beginning date.

10 Ahau 8 Muan,	*katun* ending,	1448 V 18
minus 4.0		−80 days
8 Ahau 8 Zac,	*katun* beginning,	1448 II 28

To prevent confusing the new calendar of current time with the old calendar of elapsed time, the month coefficient of Zac is shifted from 8 to 7—a shift that automatically provides the new calendar with 18,980 distinctive dates in a calendar round. The relationship between 1 Pop of each calendar will be shown.

ELAPSED TIME

9 Ben	1 Pop,	1447 VIII 5
		287 days
10 Ahau	8 Muan,	1448 V 18
		78 days
10 Eznab	1 Pop,	1448 VIII 4

CURRENT TIME

10 Ix	1 Pop,	1447 VIII 6
		206 days
8 Ahau	7 Zac,	1448 II 28
		159 days
11 Cauac	1 Pop,	1448 VIII 5

Note the logical sequence of days with their proper coefficients in the change from elapsed time to current time:

[8] Morley, 1927, p. 236.
[9] Ruppert, 1927, p. 256; also 1931*a*.
[10] Ruppert, 1931*b*, p. 109; also 1935.
[11] Pollock, 1936, pp. 160–8.
[12] Thompson, 1927, p. 17.

9 Ben ends on Aug. 5, 1447
10 Ix begins on Aug. 6, 1447

10 Eznab ends on Aug. 4, 1448
11 Cauac begins on Aug. 5, 1448

11 Akbal ends on Aug. 4, 1449
12 Kan begins on Aug. 5, 1449

This relationship holds throughout the two calendars. Series of *katun* ending dates measuring elapsed time are paralled with corresponding *katun* beginning dates that measure current time.

OLD MAYA CALENDAR

10 Ahau 8 Muan, 1448 V 18
8 Ahau 8 Yax, 1468 II 3
6 Ahau 8 Tzec, 1487 X 21
4 Ahau 13 Cumhu, 1507 VII 8
2 Ahau 13 Mac, 1527 III 25
13 Ahau 13 Mol, 1546 XII 10

MEXICANIZED CALENDAR

8 Ahau 7 Zac, 1448 II 28
6 Ahau 7 Xul, 1467 XI 15
4 Ahau 7 Pop, 1487 VIII 2
2 Ahau 12 Kankin, 1507 IV 19
13 Ahau 12 Chen, 1527 I 4
11 Ahau 12 Zotz, 1546 IX 21

A year-bearer 2 Ix on 1 Pop of the Mexicanized calendar corresponds to July 13, 1543. By counting forward 217 days, a date 11 Chuen 18 Zac, corresponding to February 15, 1544, is reached. A valid double date 11 Chuen 18 Zac, February 15, 1544, is entered on page 115 of the Mani manuscript and also on page 8 of the Tizimin manuscript.

In the Europeanized calendar of the Yucatecans, 10 Chen fell on January 1, and 1 Pop on July 16. The circumstances under which this calendar came into use will be discussed.

On December 8, 1526, was published the *Capitulation* or patent to Francisco de Montejo, a native of Salamanca, Spain. The title of *Adelantado* was conferred on Montejo. He was named *Gobernador* and *Capitan General* and made *Alguacil Mayor* of Yucatan. Portions of stipulated royal revenues were assigned for the maintenance of clergy and churches until the Church was formally established in the province.

An ordinance of November 17, 1526, which was incorporated in the *Capitulation*, provided that each expedition of discovery, conquest, and trade should include two qualified members of the secular or regular clergy. The Spanish Crown and the *Adelantado* were sincere in emphasizing the spiritual obligations felt in regard to colonization. It was intended and desired to draw the Indians to true knowledge of God and of His Holy Faith through its preachings and through the example of properly endowed clergy.

In accord with his patent, Montejo brought with him to Yucatan towards the close of September, 1527, two members of the secular clergy, Juan Rodrigues de Caraveo, his own chaplain, and Pedro Fernandez, chaplain of the Armada. Also he brought a member of the regular clergy, a Carmelite, Fray Gregorio de San Martin.[13]

The immovable Feast Day of the Carmelite order was July 16, the Day of Our Lady of Mount Carmel that had been instituted in the last quarter of the fourteenth century. At no time before or after the Gregorian reform did this ecclesiastical Feast Day fall on July 26.

In 1528, Montejo defeated the natives at Chauaca and at Ake, receiving after both defeats the allegiance of the local leaders. In the latter part of 1528, the *Contador*, Alonso de Avila, second in command, moved Salamanca from Xelha where Montejo had established it the prior year to the more favorable site of Xamanha. Montejo was appointed *Alcade Mayor* of Tabasco in 1529. Aided by his son he pacified Tabasco and Xicalango. The third town of Salamanca was established at the latter place. Avila, who was brought from the east coast in 1530, reduced the province of Acalan where he founded the fourth Salamanca. In 1531, Montejo and his son met Avila at Champoton, moved the combined troops by sea, and established a base at Campeche which became the fifth town to be given the name of Salamanca. On St. Barnabas Day, June 11, 1531, Montejo celebrated a victory over the natives of the region, after which the province of Ah Canul was subjugated. Later in 1531, Avila founded the town of Villa Real at Chetumal on the east coast of Yucatan.

Meanwhile, the secular and regular clergy, engaging in missionary work, preached Christianity. Natives old and young were baptized and received into the church.

In the years 1529, 1530, 1531, and 1532, the Yucatecan date 10 Chen fell on the Christian New Year's Day, January 1; and in 1528, 1529, 1530, and 1531, the Yucatecan New Year's

[13] Tozzer, 1941, p. 48, note 234.

Day, 1 Pop, fell on the Carmelite Feast Day, July 16. January 1 and July 16 in 1531 were Sundays. During the period from March 1, 1528, to February 28, 1532, the Yucatecan *haab* was Christianized and attached to the European year.

The Spaniards defeated the inhabitants of Tiho on St. Barnabas Day, June 11, 1541, and formally founded Merida on Epiphany Day, January 6, 1542. In accordance with the Europeanized calendar, the native date 1 Pop, with a year-bearer 13 Kan, fell on July 16, 1541; 10 Chen fell on Sunday, January 1, 1542; and 1 Pop, with a year-bearer 1 Muluc, fell on Sunday, July 16, 1542.

Landa, who did not reach Yucatan until 1549, writes[14] that the natives had a year of 365 days plus 6 hours, and from these 6 hours a day was made every 4 years, so that they had a leap-year. Before the arrival of the Spaniards, the Yucatecans had no year of 366 days. After the *haab* was Christianized, they acquired European leap-years. Whether Landa wrote in 1553, 1564, or any other year, he would find, in conformity with the Europeanized calendar, 10 Chen falling on January 1, and 1 Pop falling on July 16.

Ten Chen was equated with January 1, and 1 Pop with July 16, by writers of the seventeenth and eighteenth centuries—including transcribers of the Nah, Tekax, and Kaua manuscripts—and by the scholarly Juan Pio Perez in the forties of the nineteenth century. Don Perez in his Maya Almanac[15] conformed to the Europeanized calendar by equating the correct year-bearer 1 Kan on 1 Pop with July 16, 1841, and 10 Chen with January 1, 1842.

Although native writings are usually reliable concerning year-bearers, they are replete with contradictory statements about *katuns*. According to Landa[16] the Yucatecans were wont to take *katun* stones and set them up in temples ten *tuns* or years before the *katuns* began. The taking and setting up a *katun* stone may have been confused later with the commencement of the *katun*. A passage of considerable weight in the second document of Yaxkukul[17] states specifically that 1517 was the year when the *katun* ceased to be taken, when the chronographic stone ceased to be set up.

To conclude, the Yucatecans evidently employed three different chronological systems having Maya nomenclature.

ADDENDA

Relative to sixteenth century Yucatecan calendars, a clause will be examined which reads: " . . . Landa's statement that the year started on July 26."[18]

Landa in the *Relación de la Cosas de Yucatan*, written about 1566, began his calendar with a New Year's Day, Sunday January 1. A few of his Christian dates are selected and equated with *uinal* dates.

Sunday	January	1	10 Chen
Thursday	January	12	1 Yax
Tuesday	July	11	1 Uayeb
Sunday	July	16	1 Pop

If Landa's date July 16 were shifted to July 26, the New Year's Day would shift to January 11, and Christmas would fall on January 4.

Next will be considered a statement: "The 11 Chuen 18 Zac double date, as amended by Martinez to equal February 25, leads to July 23, 1553, for 1 Pop."[19]

An entry on page 115 of the Mani manuscript and a like entry on page 8 of the Tizimin manuscript state that 11 Chuen 18 Zac fell on February 15, 1554. In *Paralelismo*,[20] Martinez writes that learned Indians convened at Bacalar on the Bay of Chetumal in 1544, consulted books which are no longer available, and determined that 11 Chuen 18 Zac corresponded to February 15, 1544. The date 11 Chuen 18 Zac which is explicitly equated with February 15, 1544, consistently falls in a year 2 Ix of a native calendar that had 1 Pop corresponding to July 13, 1543.

Proposed amendments of the logically sound double date prove on analysis to be unsatisfactory. For instance, in his amending, Martinez took an extraneous almanac that was awry, used a three-ply shift, and obtained some dates of a year 13 Kan in which 11 Chuen 18 Zac did not fall. With an irrelevant year 12 Kan, Thompson amended the amendment.

The double date 11 Chuen 18 Zac, February 15, 1544, complete and consistent, bears internal evidence of authenticity. Besides being valuable in differentiating sixteenth century Yucatecan calendars, it supplies a criterion for testing correlation theories.

[14] Tozzer, 1941, p. 134.
[15] Stephens, 1843, Vol. I, pp. 448–58.
[16] Tozzer, 1941, p. 168.
[17] Martinez, 1926*a*, p. 16.
[18] Thompson, 1935, p. 56.
[19] *Ibid.*, p. 56.
[20] Martinez, 1926*b*, p. 5.

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AN APPROACH TO THE MAYA CORRELATION PROBLEM THROUGH GUATEMALA HIGHLAND ARCHAEOLOGY AND NATIVE ANNALS

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THE historic and proto-historic archaeological sites of the Guatemala highland provide another approach to the problem of correlating the ancient Maya calendar with the European. For native annals of the highland tribes list the generations of Indian rulers from the time of the Spanish Conquest back into prehistoric phases, which one may expect the archaeologist will eventually link to remains that are associated elsewhere with dates in the Long Count.

If, for example, we can identify a certain trait complex as one brought to Guatemala by the Quiches and other tribes entering this country from the north, and if we can calculate the approximate date of their arrival by counting generations listed in the native annals, we can then assign this date to the same complex in an area where it is dated in the Maya Long Count.

Two main difficulties are at once apparent. First, the identification of any archaeological complex with a particular prehistoric ethnic group is risky business. Nevertheless, it should be, when possible at all, the last step in the historical reconstruction phase of the archaeologist's research, whether the ethnic group be one of known name, like the Quiches, or one of unknown name, like Folsom man.

The second main difficulty lies in calculating the date of a particular reign by adding the generations of rulers listed back from a known date in the European calendar. The possible duration of each reign is so variable, we must find in the native annals some indication of its duration, or we shall accumulate a possible error beyond the 260-year limit of usefulness.

The element of culture lag should also be taken into account when we assign our date to a complex of traits in another area where it is associated with a Long Count date. But a 260-year culture lag, even between distant areas, seems out of the question in Middle America, where traders roamed from Mexico to Panama and from the Atlantic to the Pacific.

This approach to the correlation problem can best be employed when several historically recorded sites have been thoroughly investigated. But lacking such comparative data, let us see how far we can get with only one site, Zacualpa, a ruin in the department of Quiche which is mentioned in the *Popol Vuh*, a collection of traditions and history written soon after the Spanish Conquest (probably to replace an earlier Quiche manuscript that had been lost), and in the *Rabinal-Achi*, an historical drama performed at Rabinal and transcribed for the Abbé Brasseur de Bourbourg by an old man of the village. It is also mentioned in at least one and possibly three sixteenth century documents.

ARCHAEOLOGICAL SEQUENCE AT ZACUALPA

Balam phase. The earliest materials found at Zacualpa correspond to those of Late Chicanel and Early Tzakol phases at Uaxactun; the end of San José I and early San José II, Benque Viejo I, Holmul I and II–IV; the end of the Miraflores phase of Kaminaljuyu and the early part of the Esperanza phase there; late Zacatenco, Gualupita I, and Late Ticoman; and Chukumuk I and the early phase at many highland Maya sites. Its time span corresponds almost exactly to that of Butler's Alta Verapaz I.

Adopting Thompson's "Scheme B,"[1] which best fits our Zacualpa findings, we estimate that Balam phase lasted from approximately 8.14.0.0.0 to 9.10.0.0.0 in the Maya Long Count.

Pokom phase. On the basis of typology (several Balam ceramic forms hold over into the new phase), this period grew gradually out of Late Balam. Pokom materials show similarities to those of the Tepeu phase of Uaxactun; San José III, IV, V; and Benque Viejo III*a*, *b*, and IV. Although we may have sampled only the late stages of the phase at Zacualpa, its time span must have reached from approximately 9.10.0.0.0 to 10.8.0.0.0 in the Maya Long Count.

* I am grateful to the Carnegie Institution of Washington for permission to use for this article many archaeological data and discussions thereof which will appear in "Archaeological Excavations at Zacualpa, Guatemala," an account of field work by the writer for the Carnegie Institution in 1935–36.

[1] Thompson, 1941, p. 103.

The Pokom phase corresponds in general to Butler's Alta Verapaz II (Chama 3 and 4).

Tohil phase. The sudden appearance of plumbate ware, animal head effigy legs on pottery,[2] and an orange-cinnamon colored pottery, together with other distinctive ceramic traits mark the beginning of this period. Our Zacualpa evidence denies any time gap between it and Pokom phase, for older ceramic traits carry over, and the new wares occur in architectural sequences that appear to be steady expansions of building units.

The most striking Tohil analogies are with Late Chukumuk, Chuitinamit, Alta Verapaz II and III, Zaculeu, and with Mixtec horizons in Oaxaca. It is significant that these resemblances between Tohil and corresponding periods of more distant northern areas other than the Alta Verapaz are no longer so vague and generalized as in preceding phases. This may be due to the uniqueness of the new ceramic traits; on the other hand, it may imply that Zacualpa was in closer touch with the north than it had been previously.

The associations with the following are clear but somewhat less distinct than those listed above: Isla de Sacrificios, Mexican Yucatan, Cholula, Cerro Montoso, Mazapan, and possibly Michoacan.

It is also noteworthy that we no longer find any close resemblances with materials from the Old Empire region to the east. What generalized analogies exist with this region are with Late Tepeu, Holmul V, San José V, possibly Benque Viejo IV, and late occupations of Piedras Negras. Vaguest of all, but still detectable, are resemblances to materials from Tulum, Aztec Tepeaca and Puebla, Nicoya Polychrome materials in Costa Rica and Nicaragua, and Chiriqui in Panama.

Tajumulco yielded many Tohil materials, and on the basis of a few published surface collections we may expect to find close analogies at Chacula, Uaxac Canal, San Andres Semetabaja, Xikomuk, and Pasejaye.

It seems that many Guatemala highland cities, while they had contacted each other previously, were now drawn together much more closely. One wonders whether this was due to the political and cultural influence of one powerful group rather than to a general increase in trade and other intercourse.

We estimate that Tohil phase began at about 10.8.0.0.0; in this we follow Thompson's Scheme B, for his Scheme A requires a long post-San José V and pre-plumbate period of which there is no trace at Zacualpa or in the closely corresponding Alta Verapaz sequence as described by Butler.[3]

Yaqui phase. We found no further building activity at Zacualpa. The site was probably abandoned, its inhabitants moving to the present site of Zacualpa which is nearby. The old site became a crematory cemetery, and it is on the basis of these cremations and crematory jars that we assign the Yaqui phase to a late protohistoric or early historic epoch.[4]

Cremations are late throughout Middle America: Hatzcap Ceel (associated with Holmul V pottery); Cave 3 at Copan; sites in northern British Honduras; a cave near Cieneguilla Ranch, Chiapas; Coyotlatelco (near Santiago Ahuitzotla); Tenayuca; Tzintzuntzan; and Omotepec Island. The custom is recorded by Torquemada, Landa, Sahagun, and Ixtlilxochitl; in the Codex Magliabecchi and the Tarascan Chronicle of Michoacan; and in accounts of the Nicarao, the Cueva, certain South American groups like the Quimbaya of Colombia, and some Indians of the West Indies.

Our Yaqui crematory jars resemble, in varying degrees, materials from Chuitinamit, Alta Verapaz IV (Chipal 3), the reoccupation period at San José, Cieneguilla Ranch, Chiapas, Yucatan (slate ware forms, a miniature vessel from the Caracol, and murals on the Temple of the Warriors and the earlier Chac Mool temple), Boruca and the highland of southern Costa Rica, and Chiriqui of Panama. We also find general similarities in late horizons of the Andean region of South America. Butler records metal associated with an analogous ware of Alta Verapaz IV, and a jar made on the *kabal* or primitive potter's "wheel."

The Yaqui phase clearly indicates the presence or the dominating influence of late Mexican Indians at Zacualpa, probably soldiers or traders. Judging from the archaeological remains, the phase was of short duration.

CONDENSED LEGENDARY AND RECORDED HISTORY OF THE QUICHES

Quiche traditional history begins with a migration from Tulan, which some scholars be-

[2] For full discussion, see Wauchope, 1941.

[3] Butler, 1940.

[4] Wauchope, 1942 and 1945.

lieve was at the time of the fall of Xibalba and the establishing of the Toltecs on the Mexican plateau. Bancroft believed that when Xbalanque and Hunahpu conquered Xibalba, this feat marked the first subordination of the ancient Guatemalan civilizations to Nahua power. The Tamub, according to tradition, were the first to leave Tulan, the Ilocab and the Tecpan next.

The thirteen tribes of Tecpan, supposedly the Pokomams and Pokonchi, were traditionally the oldest known people in Guatemala. They were already in the Verapaz, firmly established in their capital (Nimpokom near Rabinal), when the Quiches arrived. Indeed, these Pokomams were the first foes the Quiches encountered when the latter were growing to importance.

The Tamub capital was Amag-Den, reportedly a few leagues north of Utatlan; the Ilocab capital was Uquincat, reported to be northwest of Utatlan. These two groups, together with a third tribe, may have formed an early alliance in Guatemala. The Mams, too, are traditionally early in the country. When the Cakchiquels arrived they found the Mams established near Quetzaltenango and Huehuetenango and called them "Stutterers" because of their strange speech.

The Quiches and the groups associated with them (Cakchiquels, Rabinals, and Ah-Tzinuinaha) were the last to leave Tulan wandering south under the leadership of four great priests. They are supposed to have come first to the Verapaz where they conquered five of the thirteen Pokoman tribes and captured Mount Zactsuy. They next attacked Mount Cakhay, but failing, took refuge at Mount Hacavitz.

Here for a long period they fought a continuous battle for survival among hostile neighbors, before attaining considerable power. The four priest-leaders had died in the meantime, but their descendents expanded their conquests, until, by the fifth generation according to the *Popol Vuh*, they had welded a powerful monarchy. Their attainment of monarchy is signified in legend by a trip of the royal princes to receive insignia of royalty from Nacxhit. Bancroft places this in the thirteenth century, at about the same time that the Aztecs were rising to power in Mexico; we shall make our own estimate later in this article.

The three royal princes founded a capital at Izmachi. A series of wars followed their deaths, and in the fifth generation of kings, the Quiche capital, under Gucumatz, was moved from Izmachi to Gumarcaah, the site of the present ruins of Utatlan. This place must have been long in ruins from an earlier occupation, according to Bancroft, for the legends say that when Xbalanque and Hunahpu conquered Xibalba, long before, they started from Utatlan.

In the meantime, the Cakchiquels, after a defeat by the Pokomams, separated from the Quiches and wandered westward, first among the Mams and later to Lake Atitlan. One of their four branches settled at the lake; the other three moved eastward and founded a capital at Iximche, later known as Tecpan-Guatemala.

Gucumatz, who restored Utatlan to its former glory, unified the kingdom under twenty-four princes, founded colonies, and conquered most of the Guatemala "kingdoms" of that era. The name Gucumatz means "Feathered Serpent"; he therefore corresponds to the Yucatecan Kukulcan, the Mexican Quetzalcoatl, and other heroes with divine manifestations.

The third king to succeed Gucumatz was Quicab; it is in the *Popol Vuh* account of his conquests that Zacualpa (Pamaca) is first mentioned. Bancroft estimates that this seventh generation came at the end of the fourteenth century or the beginning of the fifteenth. We shall show later that judging from the date of his daughter-in-law's death, Quicab could not have ruled earlier than 1382 or later than 1492, and probably began his rule about 1467.

The results of Quicab's conquests and overexpansion are of considerable anthropological interest. The vassal chieftains, whom he appointed to govern his new colonies and to direct his frontier garrisons, became so strong in their local posts that they were able eventually to demand a new noble rank, Achihab, and a larger share of empire control. By playing one group against the other, Quicab was able to stay on the throne and at least nominally to guide the destinies of the nation, although he had lost his truly autocratic powers.

Taking advantage of this upset equilibrium, the conquered kingdoms, led by the Cakchiquels, revolted successfully. The original relationships between the kingdoms were thus restored, except that the Cakchiquels, instead of the Quiches, emerged with the balance of power in their favor.

The next four kings succeeding Quicab at Utatlan bring us, again according to Bancroft's estimate, to the beginning of the six-

teenth century. During the fourth reign, Montezuma II (the Aztec monarch) is supposed to have sent an envoy to Guatemala, announcing the arrival of the Spaniards.

Iximche, the Cakchiquel capital, was destroyed by fire in 1514. The Cakchiquel "kingdom" was further weakened by rebellions, the great plagues of 1520 and 1521, and by wars with the Quiches. Sinacam, the Cakchiquel monarch, about to be crushed by his rivals to the north, finally sent the Spaniards an appeal for help. Cortez immediately placed Pedro de Alvarado at the head of some Spanish troops and Indian allies, dispatched them to Guatemala, bringing our history to 1524 and the Conquest.

By this time, four more kings had ruled at Utatlan. The last of these tried to stop the Spaniards near Xelahuh and again near Totonicapan, but his Quiches were completely routed. As a last desperate resort, the Quiches attempted the now famous ambush at Utatlan, which failed, and Alvarado burned the Indian ruler for his treachery.

ZACUALPA ARCHAEOLOGY AND QUICHE HISTORY

The attempt to correlate an archaeological phase with an ethnic group is probably the most dangerous of all anthropological operations, yet it is one which the investigator must face eventually unless he wishes to sacrifice the last stage in historical reconstruction and an important step toward social interpretation of his materials.

It is therefore with very mincing step that I tread now on the thin ice of this stage in our article. Without supporting material from other sites, our suggested correlation is largely speculation dignified by some strong and some weak supporting evidence.

Yaqui phase. Reversing the chronological order of the Zacualpa phases described earlier, we begin with the latest or Yaqui phase. We remember (1) the sudden introduction of cremation and (2) cessation of building activity with possible abandonment of the site. We also remember that cremations are invariably late in Middle America and that they are typically Mexican in the sense that they were practiced by groups like the Aztecs, Chichimecs, Tlaxcaltecs, and Tarascans.

We do not know the date of the move to the present town of Zacualpa, but we know that it was Spanish policy to get the Indians away from their pagan temples and the other symbols of their former greatness, and require them to build, as soon as possible, new towns according to Spanish plan.[5] It seems likely that this was done at Zacualpa while the town was still under garrison guard, and it seems probable that at least part of the garrison consisted of Tlaxcalan troops which the Spaniards brought with them to Guatemala, or, possibly, Aztec troops or spy-traders who were already familiar with the country.

We have no exact date for the Spanish conquest of Zacualpa. The Spaniards did not reduce Nebaj until 1529 or 1530, and then only after an almost disastrous campaign. Uspantan, which remained defiant even after the fall of Nebaj, was crushed in December, 1530 by seventy-two Spaniards and about four hundred Tlaxcalan and other Mexican Indians. The accounts of these campaigns speak not only of fighters from Nebaj and Uspantan but also of their Indian allies from the Verapaz, Cunen, Cotzal, and the region of Sacapulas.[6] One may suppose that Zacualpa, too, had not yet been subdued. Ximenez states that Alvarado spent several days subjugating the "Province of Quiche," but neither Ximenez nor the Adelantado (in his letter to the king) mentions any Quiche towns other than Utatlan.

It seems very likely to the writer that the Yaqui phase marks the conquest of Zacualpa by the Spaniards and their Mexican Indian allies, probably about 1530 or even later. At that time the local Indians probably were placed under the domination of a Spanish-appointed Mexican Indian garrison, the members of which practiced cremation. Building activity at the old site was certainly not encouraged; in fact, it may have been abandoned at this time in favor of the new Zacualpa, built to Spanish specifications and called by a Nahua name.

We should perhaps consider here an alternative possibility, that the Yaqui phase marks the arrival of the Quiches and the conquest of Zacualpa (Pamaca) by Quicab. Much evidence is against this possibility. The Quiche kingdom flourished for generations after Quicab, but we find no post-Yaqui archaeological phase or occupation for it at Zacualpa.

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[5] For example: Remesal, 1932, ii, pp. 242–4 (1619, lib. vii, cap. xxiv); Ximenez, 1929, i, p. 484 (*ca.* 1721, cap. lxxiv).

[6] Fuentes y Guzman, 1933, iii, pp. 58–64 (1690, lib. 8, cap. vi–vii).

Furthermore, Yaqui pottery in the Alta Verapaz is associated with the *kabal*, which was used in Yucatan at the time of the Conquest.

We may add some negative evidence, too. Ximenez, drawing his material largely from Roman, does not mention cremation although he described burial practices in great detail. If cremations had been left by Aztec or other northerners during the Quiche regime, we should expect to find Quiche burials in the same deposits, as well as evidences of continued building activity and prosperity. Nor can we assume an Aztec domination of a Quiche city, for the Mexicans were never able to make much headway in the Guatemala highland. Autzol's emissaries to the highland kingdoms were rudely rebuffed and sent home by the Quiche, Cakchiquel, and Zutuhil rulers.

Tohil phase. We found no break between the Tohil phase and the preceding Pokom phase. We noted that contact with the cities to the east slackened considerably, while much clearer and stronger analogies with Oaxaca (particularly the late or Mixtec horizons there) and regions further north emerged. Close similarities with Alta Verapaz materials were maintained, and the scattered Guatemala highland sites seem to have been drawn together more closely than ever before in cultural ties.

All these factors tie in, with what seems to the writer more than coincidental neatness, to the Quiche traditions that they came down from the north, first to the Verapaz, where for probably a century or more they fought to establish themselves, and then moved westward, finally making their capital at Utatlan, less than 45 kilometers from Zacualpa. There they entered into a series of campaigns which carried large armies from one end of the highlands to the other. Even if there were no closely knit political state, cultural exchanges under such conditions must have been greatly stimulated.

These points, together with the fact that the *Popol Vuh* first mentions Zacualpa when it was conquered, along with Rabinal and other places, by the Quiche king, Quicab, suggests to the writer that the Tohil phase of Zacualpa was the period in this city's history when it was under the political and cultural domination of the Quiche. This was no period of short duration like the Yaqui phase; the Indians still speak the Quiche language, even though Nahua speakers later changed the name of their town.

Pokom phase. For calendar correlation purposes we could stop with the Tohil phase, but I wish to mention at least one interesting circumstance in connection with the Pokom phase.

If we accept the coordination of history and archaeology suggested so far, we must assume that the Pokom phase inhabitants of Zacualpa were earlier natives closely affiliated with groups in the Verapaz. One is scarcely justified even in guessing who these natives were at so early a period. I timidly offer the suggestion that they may have been one of the thirteen tribes of Tecpan, possibly Pokomam speakers, who according to tradition, were the first foes of the Quiches in the Alta Verapaz.

The Pokom phase is much better represented in Butler's Period II of the Alta Verapaz, where it includes the well known three-and four-color polychrome cylindrical vessels and carved vases of Chama and the Chixoy. Several typical Tohil phase ceramic traits appear slightly earlier in the Alta Verapaz than they do at Zacualpa. For instance, negative painted tripod bowls with basal bevel or flange appear in Chama 3, which is pre-plumbate, but they occur at Zacualpa in the earliest of the plumbate deposits. The lamp-chimney jar and tripod bowls with cylindrical feet appear in pre-plumbate times in the Alta Verapaz, but they are not found until the Tohil phase at Zacualpa.

Do not these circumstances fit well with the suggestion that Pokom phase was a pre-Quiche period both at Zacualpa and in the Alta Verapaz? For since the Quiche spent some time in the Verapaz before reaching Zacualpa or Utatlan, one would expect Zacualpa Tohil traits to appear earlier in the Alta Verapaz.

THE GENERATIONS OF QUICHE KINGS

According to Bancroft's calculations (on the basis of generations of Quiche kings), the Quiches had risen to some prominence in the Verapaz by the twelfth century and established their monarchy about one hundred years later. Let us make our own estimate and check it against Bancroft's. We can make use of two records, the *Popol Vuh* and the *Annals of the Cakchiquels*.

The latter record begins before the Conquest. The chronicler assigns to each item a date in the Cakchiquel 260-day year. At Iximche, the days are further fixed in a sort of Long Count of elapsed time, which tells how many days and Cakchiquel vigesimal years (400 days each) have elapsed since the date of the revolt. Since the record continues later than the Conquest and records several events for which we have

exact dates in the Christian calendar, a correlation between the Cakchiquel dates and their Christian equivalents is possible. Spinden did this for a few of the dates,[7] and Long, after a careful correction of errors in Brinton's translation, listed the Christian dates for every entry in the annals,[8] except, of course, the first few entries which are not fixed in any other system of counting.

We shall start with some of the dates that will prove useful in carrying the Cakchiquel dates into the Quiche *Popol Vuh* record.

Oxlahuh Tzii, the Cakchiquel king, died in 1508. An earlier entry explains that his glory was not fully established until after the death of Quicab,[9] and others state that he was the son of Vukubatz, who was aided in regaining the throne from a predecessor by the Quiche king, Quicab.[10] Therefore Oxlahuh Tzii must have been younger than Quicab, but was rising to power while Quicab was still alive. The earliest datable entry in the *Annals* is that of the revolt in 1493. Quicab had died before that date. The native records tell us that the Yaquis arrived from Montezuma's court in 1510, during the fourth reign after Quicab.[11] All this merely establishes for us the almost useless information that Pamaca (Zacualpa) was conquered by Quicab certainly before 1493 and at least four generations before 1510.

Another approach gives us better information. Quicab's son's wife died, according to the *Annals*, in 1507.[12] Quicab therefore could have been born as many as 145 years before (if she died at the age of 90 and he was 55 when she was born) or as little as 38 years before (if she died at 20 and he was only 18 when she was born). These are the extremes, or, rather, they are the extremes that I have adopted for dealing with many generations. I trust that my virile readers of 17 and 55 will take no offense; to the former I point out that Quiche men, according to their legends, did not marry until they were about 30 years old; to the latter I explain that these warriors led violent lives and I am considering their mortality rate rather than their potentialities for child bearing.

To return to Quicab, a good midground guess might be that his daughter-in-law died at the age of 50 and he was 30 when she was born, making his birthday 80 years before 1507. Thus Quicab could have been born as early as 1362 or as late as 1469, but since he died before 1493 and could scarcely have become king before he was 20, and since his reign was an illustrious one, the date 1469 is almost beyond the realms of possibility. The midground guess would place the date of his birth at around 1427 and the beginning of his reign at 1467, although the latter event could, under unusual conditions, have been as early as 1362. Five reigns in something over 43 years are probably not too many for those stormy times.

Now let us carry these calculations back beyond Quicab, during whose reign Zacualpa is first mentioned in the *Popol Vuh*. According to the record, he was the third king succeeding Gucumatz, who founded the Quiche capital at Utatlan. The earliest date that Gucumatz could have been born (on the basis of 55 years to the generation) was therefore 1197 A.D., while the latest possible date (on the basis of 18 years to the generation) was 1415. A safer estimate (30 years to the generation) brings us to about 1330 for the date of Gucumatz' birth.

Utatlan therefore could not have been established as the Quiche capital before 1217 (if Gucumatz was only 20 and had been born in 1197) or after 1490 (if he founded Utatlan on the last year of his life and his two successors ruled only one year apiece and the latest possible date is taken for Quicab's reign). Another midground guess for the founding of the Quiche capital would be about 1370, when Gucumatz was 40 years old if he was born about 1330.

Gucumatz was the fifth generation of Quiche kings who succeeded the three royal princes. Counting back by generations, again using a maximum of 55 years, a minimum of 18, and a probable of 30 years, we arrive, for the earliest possible average date for the three princes, at 977 A.D., latest at 1343, and more probable at 1210 A.D.

The Quiche probably received their "insignia of royalty" (when their empire had grown to power) about 30 to 50 years after the average date of birth of the three princes. My guess would be about 1250 A.D.

Thus, while the accumulation of maximum and minimum calculated periods brings about a difference between the earliest and latest possible dates for the achievement of greatness by

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[7] Spinden, 1924, p. 105.
[8] Long, 1934, pp. 57–68.
[9] Brinton, 1885, p. 145 (Entry 89).
[10] *Ibid.*, p. 58.
[11] *Ibid.*, p. 165 (Entry 117); Long, 1934, p. 66.
[12] Brinton, 1885, p. 163 (Entry 114); Long, 1934, p. 66.

the Quiches amounting to about 400 years, and thereby theoretically prohibits the limiting of our dating to one choice of Maya-Christian correlations which are only 260 years apart, we must remember that both our earliest and latest dates are beyond the realms of remote probability.

To accept the earliest date, we would have to believe that Quicab's daughter-in-law died at the age of 90, that he was 55 when she was born, that seven generations of kings before Quicab, all living violent lives, averaged 55 years apiece! To accept the latest date we would have to assume that Quicab's daughter-in-law died at the age of 20, that he was only 18 when she was born, that his eventful reign lasted only a few years, that the four reigns after Quicab lasted less than 5 years apiece, that seven generations of kings before him averaged only 18 years apiece, and that the three princes were about 64 years old when they received the insignia of royalty!

THE CORRELATION OF CHRISTIAN AND MAYA CALENDARS

Let us apply these dates to our Zacualpa archaeology. If we accept the Tohil phase as the approximate arrival of Quiche influence, seven generations before Quicab conquered Zacualpa, we get, for the beginning of the Tohil phase, the earliest possible date, about 1000 A.D., the latest possible date, about 1403, and the probable date about 1250 A.D.

As we have shown before, all archaeological evidence at Zacualpa and in the Alta Verapaz favors Thompson's Scheme B rather than his Scheme A. Scheme B places the introduction of Plumbate ware at 10.8.0.0.0 (rather than at 10.19.0.0.0 as in Scheme A). Correlating 10.8.0.0.0 with a date within 130 years of 1250 A.D. brings us to the date 1247 A.D., which is that of an 11.3.0.0.0 correlation and hits within 3 years of our estimate based on the Quiche and Cakchiquel annals.

An 11.16.0.0.0 correlation gives the date 987 A.D. for 10.8.0.0.0. This is 13 years earlier than the earliest possible estimate we could arrive at, even if we permit ourselves to accept the impossible series of conditions already described.

Scheme A of Thompson places the introduction of Plumbate ware at about 10.19.0.0.0, which would correspond to 1204 A.D. in an 11.16.0.0.0 correlation. Neither the Zacualpa sequence nor that of the Alta Verapaz shows any sign of a post-San José V and pre-Plumbate period comparable in length to the Late Puuc (Carved Slate) phase required in such a scheme.

Should we disregard all astronomical evidence, all Yucatecan native history, everything save the Zacualpa evidence and that of the Alta Verapaz, the 11.3.0.0.0 correlation is the only possible scheme that would coincide with identifying the Quiche with the Tohil phase.

Naturally, the other evidences cannot be lightly dismissed. Plumbate and Fine Orange both disappear in the Valley of Mexico before Aztec I, at a date before 1247 according to authorities on that area. To accept an 11.3.0 0.0 correlation, we should probably have to associate Hunac Ceel with a later Katun 8 Ahau, that which lasted from 1444 to 1464. In such a case, the fall of Mayapan and the abandonment of Chichen Itza by the Itza would have coincided, and would bring the Itza withdrawal to within a hundred years of the Conquest, as recorded by Father Fuensalida.

In an 11.3.0.0.0 correlation, Kukulcan, the Yucatecan Quetzalcoatl, would have led the Itzas to Chichen Itza in a Katun 4 Ahau which lasted from 1227 to 1247, which is considerably closer to the date we have estimated as that at which Gucumatz, the Quiche equivalent of the Feathered Serpent Hero, would be leading the Quiches to their new capital of Gumarcaah (Utatlan).

Our second choice of the phase during which Quiche influence reached Zacualpa is the Yaqui phase. If we choose this period, we must believe that the Quiche conquest resulted in virtual abandonment of the city, either the newcomers being ruthless destroyers or the stormy times such as to require the abandonment of valley sites in favor of the more easily defended fortresses like Utatlan and Iximche. In either case it is difficult to imagine the Indians returning over two centuries later to found the modern town of Zacualpa. Furthermore, there is the negative evidence of cremations vs. burials, which we have already mentioned.

Nevertheless, that the Yaqui phase marked the arrival of the Quiches is a possibility which must not be overlooked. If we choose it instead of the Tohil phase, and stick to Thompson's Scheme B (which would still best fit our Zacualpa sequence), we should equate 10.19.0.0.0, or, perhaps better, 11.1.0.0.0, with the nearest date to 1250 A.D. In the latter case, we find that the 11.16.0.0.0 correlation provides a date within six years of our calculations: 1244 A.D.

CONCLUSION

May I remind the reader that this article is intended primarily to show how an approach to the correlation problem is provided by Guatemala highland archaeology and native annals. As best we could, we applied materials from a single site, Zacualpa, to the problem to illustrate the method.

It should also be remembered that we use the word Quiche only because we are dealing with a Quiche region. We do not imply that plumbate or any Yaqui ware was a Quiche product only. We refer, rather, to the movement from the north which brought Quiches, Cakchiquels, Rabinals, etc. to Guatemala.

Interpreting our Tohil materials as Quiche-inspired, we arrived at a Christian date for a prehistoric event which fell within three years of the date an 11.3.0.0.0 correlation would require. In contrast, the next nearest or 11.16.0.0.0 correlation requires a date thirteen years earlier than the earliest possible estimate we could calculate by permitting ourselves to adopt an almost impossible series of generation estimates.

Interpreting the Yaqui phase as the first Quiche remains, we found that an 11.16.0.0.0 correlation provides a date within six years of our estimate.

I would not care to choose finally between the Tohil and Yaqui phases until more known Conquest sites have been excavated. Investigation of Utatlan and Iximche is on the schedule for the 1947 Tulane expedition, and should help to solve the problem.

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ARCHAEOLOGY OF THE MIDDLE RÍO BALSAS BASIN, MEXICO

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INTRODUCTION

ARCHAEOLOGICAL reconnaissance and excavations in the Río Balsas drainage basin of Guerrero and Michoacán were undertaken by parties from the University of New Mexico during the summers of 1939 and 1941.[1] As a result of the first summer's work, three publications have appeared.[2] This paper will cover the archaeological remains in the Middle Río Balsas Basin of Guerrero and Michoacán. It will include the results of both summers' work and be based on surface observations and collections, and on excavations conducted at three sites.[3]

For the most part the reconnaissance was undertaken on foot or horseback, inasmuch as the few roads that existed in the area were made impassable for vehicles by the summer rains.

Early archaeological work was done on the eastern and western borders of the Middle Río Balsas Basin by Pepper, Lumholtz, and Starr in the 1880's and 1890's.[4] However, they did not get into the area covered by this paper. Spinden reported on archaeological material obtained by William Niven at Placeres del Oro in an article in the *American Anthropologist* in 1911.[5] In addition to the University of New Mexico surveys, the following work in the area has been accomplished recently. William Spratling, of Taxco, Guerrero, has collected in Guerrero.[6] Pedro R. Hendrichs published a report dealing with the ethnography, geography, and economics of the area, in which he touched on the archaeology.[7] Pedro Armillas has made several archaeological surveys through the Balsas country. Some of his material will be incorporated in this work in order to present a more complete picture of the archaeology of the area.[8] R. J. Weitlaner made surveys in western Guerrero, obtaining material on ethnology and archaeology.[9]

The area covered by this report extended from Tetela del Río in the east to San Jerónimo in the west and included the country on both sides of the Río Balsas. This may be termed the Middle Basin of the Río Balsas. The river in this area flows through an east-west structural depression between the central Mexican plateau and the Sierra Madre del Sur. Elevations in the valley range from 350 to 1500 feet, placing the entire area within the hotter and drier section of the *Tierra Caliente*. It is the Arid Tropical Life Zone. Quite high temperatures are reached during the dry season, especially during the months of March and April; in fact, the valley of the Balsas has the hottest year-around climate in Mexico. The wet season, June to September, is marked by heavy nightly showers. Water is plentiful during the rainy season, but during the dry season the obtaining of drinking water is sometimes a serious problem to the natives. The landscape features thorny leguminous shrubs and trees, cacti and grasses (Pl. VIII, *upper left*).

Geologically the area is composed of ancient gneisses, schists, and granites, frequently covered by limestones, shales, and slates. In places Tertiary volcanics form the upper mantle. The river basin is covered by Quaternary alluviums.

An indication of the complexity of the archaeological problem that might be expected along the Río Balsas is given in a perusal of the documentary material on the area. Brand[10] makes a statement based on Tarascan tradition, *Relaciones geográficas de Indias*, 1579–82, and the sixteenth century distribution of Tarascan speech and place names, to the effect that the *Tierra Caliente* lands of the Balsas were conquered between 1370 and 1440 by the Tarascans. These lands were occupied by such peoples as the Cuitlatecos, Apanecos, Chumb-

[1] Both parties were led by Dr. Donald D. Brand. The following students made up the 1939 group: John Goggin, Robert Lister, Douglas Osborne, and William Pearce, of the University of New Mexico; and Hugo Moedano of the National University of Mexico. Only two students, Robert Lister and Daniel McKnight, assisted Dr. Brand in 1941.

[2] Brand, 1943*b*; Goggin, 1943; Osborne, D., 1943.

[3] The Instituto Nacional de Antropología e Historia and the Instituto Panamericano de Geografía e Historia granted us many aids and courtesies. To them our thanks are extended.

[4] Pepper, 1916; Lumholtz, 1902.

[5] Spinden, 1911.

[6] Spratling, 1932.

[7] Hendrichs, 1945, 1946.

[8] Armillas, 1944 and 1945.

[9] Weitlaner, 1944.

[10] Brand, 1944, p. 43.

ios, Tolemecos, Nahuatlans, Cuauhcomecos, and Xilotlantzincos.

The Tarascans remained in the Zirándaro-Coyuca-Cutzamala-Ajuchitlán area until the coming of the Spaniards,[11] and were pushing into north central Guerrero from garrison centers at Ajuchitlán and Cutzamala at that time.[12]

The Matlatzinca occupied some of the area around Huetamo. They were granted this land for helping the Tarascans in their wars against the Aztecs.[13]

A few Cuitlatecos still live in San Miguel Totolapan, and it is known that formerly they occupied a larger area. The Aztecs conquered part of the Cuitlatecos in the valley of the Balsas during Ahuitzotl's time (1485–1502).[14]

Aztec conquests down the Río Balsas extended as far as Pezuapan, between Tetela del Río and Ajuchitlán, where they were checked by the Tarascans.[15] Both the Aztecs and the Tarascans then set up lines of garrisons and forts against each other. The Aztec line reached the Balsas at Tetela del Río; the Tarascans' defenses extended from the north down through Cutzamala to Ajuchitlán.[16]

Another group to be considered in the area are the Chontal. At one time they were spread from the Río Balsas north almost to the Nevada de Toluca, and from the Río Cutzamala east to the Río Cocula, Iguala, and Taxco.[17]

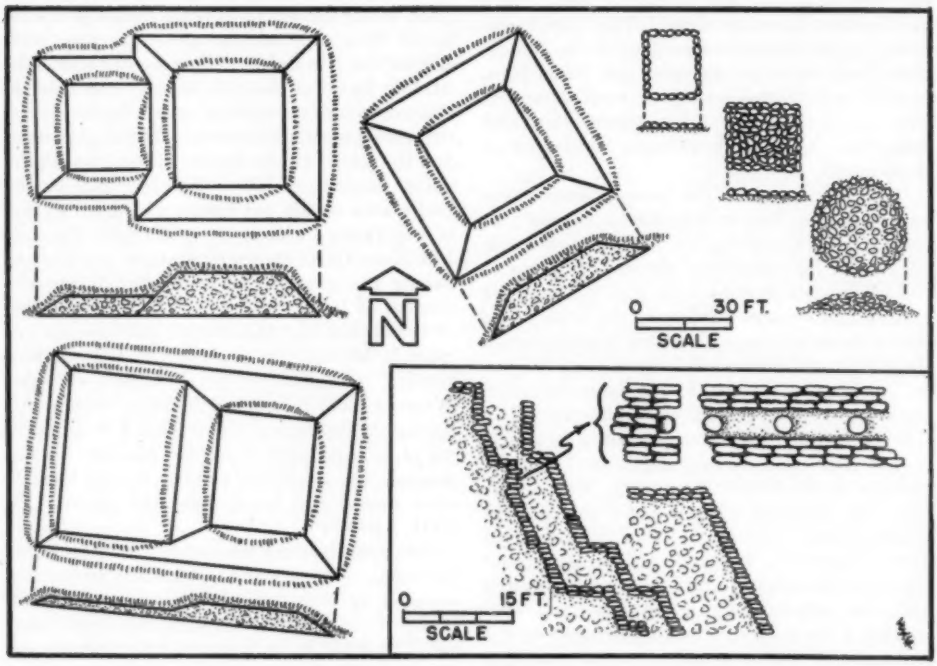


FIG. 5. Typical ruins, Middle Balsas Basin, Guerrero, Mexico. *Inset*, pyramid facings, Ajuchitlan.

SITES

Archaeological sites in the area are known principally by two names. In the east the local Mexicano term *mumuxtli* is used for all types of mounds, and in the west the Tarascan word *ýácata* is utilized.

[11] Brand, 1943*b*, p. 147.
[12] Brand, 1944, p. 41.
[13] Osborne, C. M., 1941, p. 101.
[14] Brand, 1944, p. 42.
[15] Brand, 1944, p. 42.
[16] Brand, 1944, p. 42; Hendrichs, 1945, p. 228.
[17] Brand, 1944, map facing p. 60.

A survey of the area has revealed the following types of sites (Fig. 5).

1. *House remains.* The style most commonly seen consisted of rectangular or square outlines of stone twelve to thirty feet on a side (Pl. VIII, *lower right*). The outlines were made up of one or two rows of water-worn stones varying in width from one to three feet. Occasionally outlines with rounded corners were observed. Such rock outlines probably were remains of foundations of *jacal* type houses. To judge by present day houses in the area, the foundations originally consisted of rubble (rock and mud); on that, walls of reed, cane, and mud were placed, and covering the hut was a thatched roof. Bits of fire-hardened mud with reed and grass impressions, undoubtedly pieces of roof or wall remains, were found in the rock outlines.

Another type of rock outline had stones strewn over and about the house site. This type of hut may have had rubble walls (a type still employed in the region); when they went to pieces, the rocks fell on both sides of the foundation stones, which remained in place because they were partially buried in the ground. In a few instances, the interiors of rock outlines were so filled with rocks as to suggest cobblestone floors.

House remains were usually located on level ground in more or less open areas. However, at El Respaldo (site 24), near Coyuca, they were found on the sides and top of a good sized hill. They generally were found in groups suggesting villages. In a few instances, groups of remains were found on low artificial platforms.

Sites 24, 26, 33, 38, 40, and 42 exemplified the above type of remains.

2. *Truncated pyramids.* Isolated, truncated pyramids occurred throughout the area. (Pl. VIII, *lower left*). As a rule, they were square-based, flat-topped, and had well sloping sides. Size varied considerably. Pyramidal bases ranged from sixty feet to four hundred feet. Height varied from six feet to ninety feet. Stones and mounds on top of most of the pyramids indicated the former existence of structures. Wherever treasure seekers had dug into mounds of this type, rubble cores were revealed. Pyramid faces probably were finished with shaped stones and then covered with plaster. Bits of thick white plaster frequently were found about the pyramids. The pyramids were located on the flat alluvial plain adjacent to the Río Balsas or at junctions of tributary streams and the Balsas.

Sites 15, 16, 25, 27, 28, 30, 35, 36, 37 consisted of isolated, truncated pyramids.

3. *Truncated pyramids associated with platforms and other earthworks.* This group included the largest and most impressive sites along the Río Balsas. Over half of the ruins in the area were of this type. Several variations were noted. A number consisted of a truncated pyramid with a much lower platform built on to the eastern, western, or northern side of the pyramid. About the structure generally were smaller mounds.

A combination noted fourteen times was the arrangement of truncated pyramids and wedge-shaped platforms in court-like shapes. Some of these platforms had dirt cores and were faced with water-worn rocks. Courts were U-shaped, square, or triangular and were from one hundred to three hundred feet across. Wall outlines of some of the court-shaped platforms indicated their use as bases for other structures.

Large hillsides and mountain sides were sometimes terraced and groups of platforms, mounds, and truncated pyramids placed on them. Small natural hills occasionally were used as cores for platforms and truncated pyramids.

Some pyramid and platform tops were flat, but generally there were ridges and mounds of dirt and stones upon them. All of the cores of these structures that could be examined were made up of rubble. A number of instances of rebuilding or remodeling pyramids were noted. A partially exposed pyramid at Ajuchitlán (site 29) revealed a well-made facing of shaped stones covered with thick white plaster. Three building periods could be seen. Armillas pictures a pyramid facing at Mexiquito (site 3) in which two building periods are visible.[18] A truncated pyramid at Zirándaro (site 5) showed two building periods.

The largest group of such remains was at Mexiquito (site 3), where a large L-shaped hill on the bank of the Balsas was completely covered by terraces, groups of platforms, mounds, and truncated pyramids. The hill stands two hundred and fifty or three hundred feet high and has direct command of the Río Balsas. The areas about the base of the hill, especially to the east, contained many truncated pyramids and platforms arranged about courts. The tremendous number of structures at Mexiquito, and their impressive location, would imply a religious or secular center at that

[18] Armillas, 1944, p. 254.

site. However, it is not known whether all of the sites were utilized simultaneously.

On many of the bluffs and hills commanding the Río Balsas were located terraces, mounds, platforms, and pyramids. Such sites were noted at San Jeronimo (site 1), Mexiquito (site 3), Catatemba (site 4), El Quimis at Zirándaro (site 5), Characuareo (site 7), La Huisachal (site 19), El Respaldo at Coyuca (site 24), Amuco (site 25), El Embarcador at Ajuchitlán (site 29), El Cubo Viejo (site 35), Cuadrillo de Santo Tomás (site 39), and Tetela del Río (site 42). The concentration of remains, combined with their strategic locations, suggest defensive sites or forts. Brand has discussed how these forts not only commanded passage on the river, but also could have constituted a chain of signal stations up and down the Balsas.[19]

Sites 1, 2, 3, 4, 5, 7, 9, 11, 13, 16, 19, 21, 22, 23, 24, 25, 29, 30, 32, 34, 35, 36, 37, 39, and 42 belong in this category.

4. *Mounds.* There were a few instances of groups of low rock-covered mounds (Pl. VIII, *upper right*). Usually they were circular or oblong in outline and measured twenty to one hundred feet across. They were four to eight feet high. The largest concentration of such mounds was in the area about San Miguel Totolapan (site 31).

Sites 24 and 31 contained mounds.

5. *Ball courts.* Armillas and Osborne have tentatively identified several ball courts in the area. Armillas speaks of H-shaped courts at Citahua (site 36) and Placeres del Oro (site 16) and a rectangular one at Pandacuareo (site 15).[20] Osborne suggests the presence of a rectangular ball court at Purechucho (site 13).[21]

EXCAVATIONS

Stratigraphic trenches were dug at three sites, San Miguel Totolapan, Coyuca, and Santiago in an effort to obtain information about pottery wares, to test wall outlines, and to determine the purpose of small, rock covered mounds. Sites distant from one another were chosen in order to get a better sampling of the area as a whole.

San Miguel Totolapan

The site was located two-thirds of a mile west of San Miguel Totolapan and was about one hundred and fifty yards south of the Río Balsas. The area was known locally as "Tiembla la Tierra." Sherds were found scattered over twenty or thirty acres of corn fields. Three mounds covered with river worn rocks were the principal features. They were grouped within two hundred and fifty yards of one another. The largest was rectangular in outline and measured one hundred feet long, fifty feet wide, and stood six feet high. The other mounds were circular and averaged twenty-five feet in diameter and three feet in height.

Trenches were dug along the western sides and extended into the centers of each of the small mounds. The trenches were carried down below cultural material.

A burial, or possibly two burials, was encountered twelve inches below the surface directly in front of one of the mounds. Some fragments of long bones and a few skull pieces were all that remained. In addition to being poorly preserved, they appeared badly disturbed. It was impossible to determine burial position. A small jar of Balsas Red, Coarse, containing bits of calcined human bones together with a few bird bones, was found toward the individual's feet. This could have represented a cremation, in which the burned bones were buried in the funerary urn and the unburned portions of the long bones and skull were placed in the ground along side the urn. On the other hand, it may have represented two burials, one a primary inhumation, and the other an urn burial of cremated remains.

A pocket of black ashy material was found resting on rock fourteen inches below the surface at the bottom of one of the trenches. The pocket was eighteen inches in diameter and six inches thick. Mixed with the ashy material were bits of burned human bones, single flake obsidian knives, three obsidian projectile points, and a copper awl-like implement. This appeared to have been a cremation platform.

The trenches into the mounds revealed cores of large rocks, dirt, and potsherds. No facings, such as might be expected on platforms or pyramids, were found. It is possible that the facings had been destroyed and that we dug into the rubble that made up the cores. The ground on which the mounds were built was strewn with sherds before the building took place.

Balsas Red ware, in both Fine and Coarse variants, was found in the trenches from top to bottom. No other ware was present in the trenches. However, surface finds included

[19] Brand, 1943, p. 43.
[20] Armillas, 1944, p. 80.
[21] Osborne, D., 1943, p. 62.

Zimátepec Black-on-White, Chandio White-on-Red, Totolapan Red-on-Tan, and La Huisachal Incised pottery wares.

Recovered from the excavations or from the surface collection, in addition to the items already mentioned, were: legless trough metates; numerous single flake obsidian knives; obsidian projectile points, generally with both side and basal notches; spindle whorls; a badly weathered figurine; a stone celt; and a small basalt pestle.

The site was primarily a habitation site. Perhaps small religious or secular structures had been erected on the low mounds.

Coyuca de Catalan

A site was located just south of Coyuca on Cerro El Respaldo. In fact, from the outskirts of the town on out to the end of the hill, one could find evidence of prehistoric occupation in the form of sherds and worked obsidian. A large mound made up of river worn boulders could be seen along the trail between the town and El Respaldo.

Cerro El Respaldo is situated on the west bank of Río Cuirio, just south of where it empties into the Río Balsas. The hill is about eighty feet high and slopes down to the Río Cuirio in five terraces. It is roughly oblong and its greatest axis, lying east-west, is three hundred yards long. A thick vegetation, consisting mainly of thorny legumes and cacti covers the hill. Scattered over the entire hill were small platforms and terraces upon which were located many low rock-covered mounds and rectangular outlines of stones.

Excavations were conducted in four of the rock outlines. They revealed that the outlines were wall remains or wall foundations. Possibly two types of houses were constructed. One may have been of wattle and daub or cane walls set on a foundation of stone and covered by a thatched roof. The remains of such a house would be evidenced by the rectangular rock outlines. A second house type, suggested by the low rock mounds, had walls of rubble plus a thatch roof. The collapse of the walls caused a mound of stones to be built up. Sherds and general village refuse were found below the walls, suggesting that the houses were built upon an area over which refuse had been strewn earlier, or that artificial platforms to serve as house bases were built up of dirt and trash from the area. A number of pieces of fire hardened clay with reed and grass impressions were found in the house fill. These were bits of roof or wall remains. The rock outlines had their long axes oriented east-west. Their widths consistently measured eight or nine feet, but lengths varied from ten to thirty-six feet.

Cerro El Respaldo must have been a habitation site with agricultural fields to the east, north, and west. Soil on the Cerro itself was not deep enough for agriculture. The type of remain and the fact that the site covered a large area precludes its use as a strictly religious or ceremonial center. Both land and water, two essentials necessary for an agricultural village, were available.

Nearly four thousand sherds from the stratigraphic trenches were obtained and studied. The Balsas Red wares were very numerous in all levels. A few wares were diagnostic. Chandio Red-on-White was found only in upper levels. Zimatepec Black-on-White, though present in all levels, occurred in much greater numbers in the upper levels. La Huisachal Orange was more numerous in lower levels than in upper levels.

Obsidian spalls and single flake knife blades were abundant on the surface and in the excavations. Thirty-five large obsidian cores, from which single flake knives were struck, were recovered from one small house. The obsidian was of both black and green types. As far as is known, the closest obsidian to be found is approximately sixty miles to the north, near Zitácuaro, Michoacán. Wherever the material was found, it apparently was transported to Coyuca in an unworked state and the artifacts fashioned from it there.

Included in the surface collection are eighteen pieces of pipe stems and one piece of a pipe bowl. As will be pointed out later, they are similar to specimens from Tzintzuntzan, Michoacán. Also similar to items found at Tzintzuntzan are two vessel spouts and one stirrup handle found on the surface at Coyuca. Both legged and legless trough metates of vesicular basalt were observed. Spindle whorls were found in numbers, as were obsidian projectile points. A pottery seal, several green stone beads, and a few pieces of shell ornaments also were collected. A stone fiber beater was recovered in one of the trenches. No burials were encountered at Coyuca.

Santiago

Five large mounds covered with water worn rocks were found on the west bank of the Río

Tacámbaro about one mile northwest of the small village of Santiago. Three of the rectangular mounds were grouped together in a U-shape. Parallel mounds averaging one hundred twenty feet in width and one hundred fifty feet long made up the sides of the U, while a smaller mound fifty feet wide and one hundred thirty feet long formed the bottom. They averaged twelve feet in height. A few rock outlines were visible on the south mound. The plaza formed between the mounds faced east. A single mound was located two hundred yards to the west, and another two hundred fifty yards to the south of the main group.

Four trenches were dug at this site, one in the plaza of the main group, one on top of one of the large mounds making up the sides of the U-shaped structure, and the third and fourth on the top and side of the mound to the west of the main group.

Excavations revealed that the mounds were built of dirt with facings of water-worn stones. In the plaza a lens of charcoal and burned rocks was found at a depth of thirty inches. It appeared to be an old fire area or fireplace. No stratigraphy was obtained. Only a few sherds of Balsas Red wares were encountered. An unusually large globular jar was found just below the surface of one trench. It was of Balsas Red, Coarse and measured three feet in diameter. The vessel walls averaged three-fourths of an inch thick and one inch thick at the rim. Two horizontal loop lugs, one and one half inches in diameter, were attached to the sides of the vessel, above the shoulder.

A legless trough metate of basalt was observed on the surface of one of the mounds. A small green stone bead was collected. No burials were encountered.

This appears to have been a combination village site and religious center, judging by the types of mounds present.

POTTERY

Pottery wares in the Middle Balsas Basin are not outstanding. True, potsherds are found at all sites, but for the most part, they are of coarse undecorated wares and are very badly weathered. The actions of rains and humic acids in the soil have altered the surfaces of most sherds. This is true even of the few decorated wares, making their recognition very difficult.

After carefully studying the sherd material, the types listed below have been identified. The types are described here, together with their known distribution.

Balsas Red, Coarse[22]

Temper: abundant and consists of small white rocks and sand; thick sherds show extremely heavy temper.

Paste: tan to red; black firing streak frequently present. Surfaces are smoothed but rarely slipped. The exteriors are better smoothed than the interiors. Many surfaces show heavy smoothing marks, and a few surfaces are striated as though smoothed with some sort of grass brush. Walls are thick, ranging from one-quarter of an inch to three-quarters of an inch. Rims generally are much thicker than the vessel walls, ranging up to one inch. Rims may be simple, flaring, or carry an angular lip. Jars frequently have crenelated shoulders. A punched design was noted on a few sherds.

Form: jars, shallow bowls, tripod bowls, and *molcajetes*. Lugs were of several types. A heavy loop lug was most numerous; however, there were instances of small nubs and wedge-shaped lugs. Conical legs and human effigy legs were used on tripod vessels.

Several sherds were recovered that had small circular holes punched through them. They were all parts of tripod bowls and could have served as sieves of some sort.

Distribution. Balsas Red, Coarse is widespread over the entire area. In fact, it is known that it also spreads out of the Balsas lowlands toward the north as far as the region about Teloloapan, Guerrero.

Balsas Red, Fine

Basically this is the same ware as Balsas Red, Coarse, but it has thinner walls and finer paste. It is generally slipped and always smoothed. It ranges in color from red to almost gray.

Form: shallow bowls, *molcajetes*, and tripod bowls. Solid conical legs and short hollow conical legs with rattles were the principal types of supports for tripod vessels. Annular bases were quite numerous. Loop legs were occasionally noted. Several effigy supports were collected. They were zoömorphic in nature. Lugs were of the loop and wedge varieties. A few of the more tan pieces have red rims.

Distribution. This ware has the same distribution as Balsas Red, Coarse.

Cútzeo Polished Black[23]

Temper: very fine white particles.

Paste: brown to gray, depending upon firing; hard. Surfaces are very well smoothed and have been both slipped and polished. Walls are thin, averaging three-sixteenths of

[22] This is the same ware that D. Osborne (1943, p. 62) identified as Huetamo Red Coarse. In his detailed report of the Huetamo area, on file at the University of New Mexico, he says that this ware should be called Balsas Red, if it is found over the entire area. This has proven to be the case. Therefore, the author is taking the liberty of calling it Balsas Red, with Coarse and Fine variants.

[23] Osborne, D., 1943, p. 63.

an inch in thickness. Surface color varies from gray to black. Rims appear always to be straight-sided.

Form: bowls with annular bases.

Distribution. The ware is confined to the area west of Ajuchitlán. It has its greatest concentration about Huetamo and appears to decline in numbers to the east and west. Its eastern range is not known.

La Huisachal Orange[24]

Temper: abundant, small white rock and sand.

Paste: tan to orange. Surfaces are slipped with an orange-tan slip. It is well smoothed and sometimes polished. Polishing streaks occasionally are visible. The surface appears crackled at times. Walls range from three-sixteenths to one-quarter of an inch in thickness. A few sherds carried an exterior incised decoration.

Form: bowls.

Distribution. Orange ware is confined principally to a small area around La Huisachal including Jario, Coyuca, and Amuco. A few sherds were found at Zirándaro. Osborne says that this ware has a late appearance in the La Huisachal area and may be an imitation of an Aztec ware.[25] However at Coyuca the ware was found to be most numerous in the lower levels of a stratigraphic trench. This would argue against its being an imitation of Aztec ware.

Chandio White-on-Red[26]

Temper: fine to medium sand.

Paste: brown, fairly hard. White and red paint has been applied to the surfaces. The white was quite soft and was thickly applied. It weathered off easily. Designs are mostly white bands just below the exterior of rims, crude circles, frets, and dots. The white was applied in wide crudely executed elements.

Form. Goggin reports only *molcajetes* from the Tepalcatepec Basin,[27] but shallow bowl sherds were recovered along the Balsas.

Distribution. This is a ware found by Goggin in 1939 near Apatzingán, Michoacán, and by Osborne at Mexiquito, Guerrero. It was found in the Balsas Basin from San Miguel Totolapan westward.

Zimátepec Black-on-White[28]

Temper: abundant white sand and rock.

Paste: brown; soft. Surfaces are poorly smoothed with temper protruding. A thick white slip was applied to exposed surfaces. The slip is very soft and fugitive and weathers off the vessel very easily. Walls are from three-sixteenths to one-fourth of an inch thick. Decoration consists of black geometric and curvilinear designs on the white slip. Jar necks commonly have bands of interlocking curved lines encircling them. The black paint is also very soft and can be scraped off with the fingernail. Line work is heavy. It is doubtful whether this ware was fired after the slip and decoration had been painted on the vessel.

Form: globular jars, bowls, tripod bowls, and *molcajetes*. Loop lugs and loop legs were employed.

Distribution. Zimátepec Black-on-White was found from Coyuca eastward. It covers the eastern half of the Balsas Basin and extends northward almost to the Teloloapan area.

La Huisachal Incised Red[29]

A few sherds with exterior incising were collected. In general they are very similar to Balsas Red, Fine with the addition of exterior incised designs. The incising usually takes the form of cross hatching and is frequently found in vertical panels on vessel sides. Only straight-sided bowl sherds were recovered.

Distribution. This ware was found along the Río Balsas from La Huisachal to San Miguel Totolapan.

Totolapan Red-on-Tan

Temper: Small white rock and sand.

Paste: light brown with dark carbon streak. The surface is slipped with a light tan slip that has been smoothed but not polished. Walls are thin, averaging one-fourth of an inch. Designs are painted on to the slip in a dull red paint. The line work is heavy and designs seem to be similar to those employed on Zimátepec Black-on-White.

Form: bowls, tripod *molcajetes*, and jars. Loop lugs were found.

Distribution. This red-on-tan ware was found only at San Miguel Totolapan.

Tarascan-like Appendages

At Coyuca (El Respaldo, site 24) several items were recovered that so resemble items from Tzintzuntzan, Michoacán, that they may be termed Tarascan. Of course, it is realized that the exact characteristics of Tarascan archaeology have not been determined, but if anything can be termed Tarascan, certainly the material from Tzintzuntzan, their former capital, may be so designated.

Two ceramic appendages from Coyuca may be called Tarascan. They are teapot-like vessel spouts and a stirrup handle for a vessel. The vessel spouts are similar to those illustrated by Moedano[30] and Borbolla[31] in their articles on Tzintzuntzan. They are cylindrical, taper a little toward the pouring end, and curve upward slightly. (See Fig. 6, *b*). They are two inches long and average seven-eighths of an inch in diameter. It is difficult to determine the surface finish because they are badly weathered;

[24] Osborne, D., 1943, p. 66.
[25] Osborne, D., 1943, p. 66.
[26] Goggin, 1943, p. 51; Osborne, D., 1943, p. 70.
[27] Goggin, 1943, p. 51.
[28] Brand, 1943*b*, p. 146 (Zimátepec Black-on-Gray).
[29] Osborne, D., 1943, p. 66.
[30] Moedano, 1941, p. 25, Fig. 1 (16 and 17).
[31] Borbolla, 1941, figure opposite p. 8.

but one appears to have a dull red slip and the other a red line design on a tan slip.

The stirrup handle resembles a handle shown by Moedano[32] in his Tzintzuntzan report. It is the upper portion of such a hollow handle with a small bowl-like opening at the top (Fig. 6, *a*). The handle is oblong in cross section, measures seven-eights of an inch at its greatest diameter, and is hollow. The bowl-like opening on the top is circular and is three-fourths of an inch in diameter. It has a dull red slip.

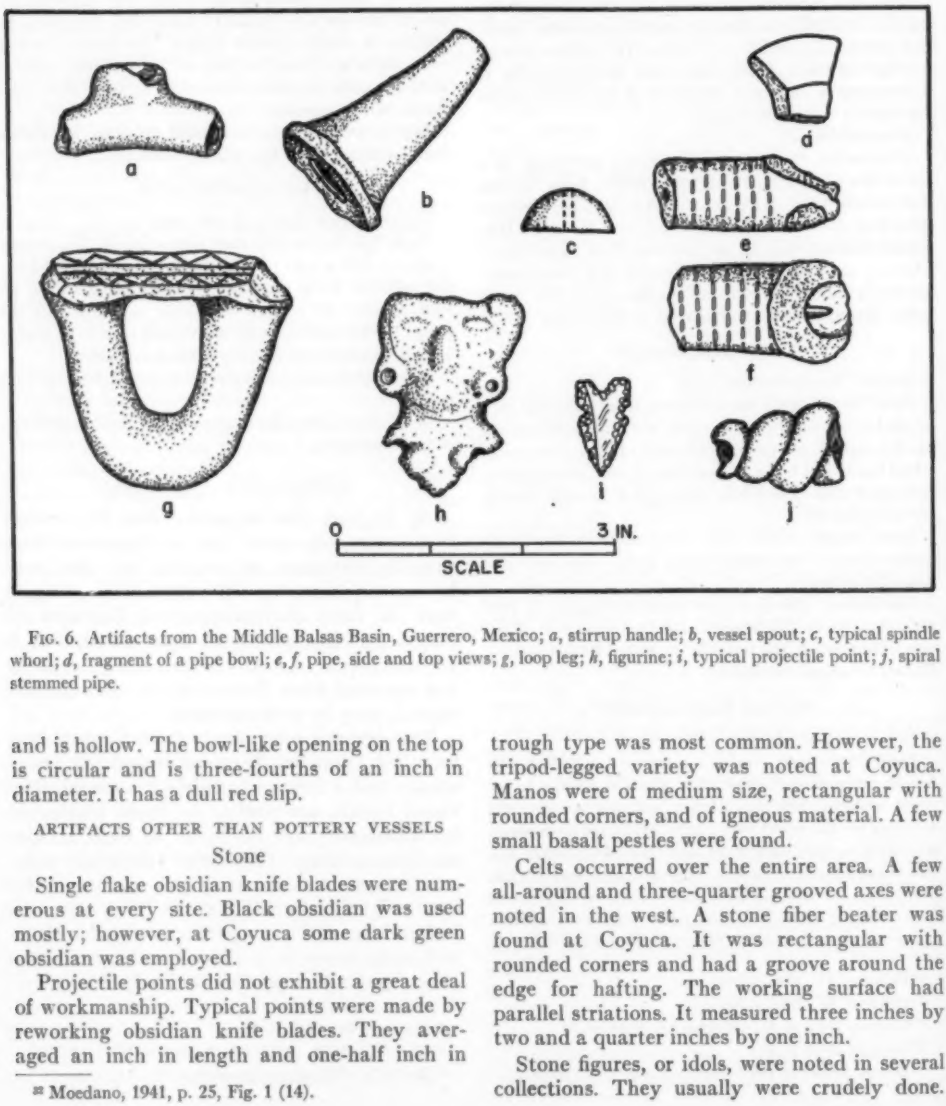


FIG. 6. Artifacts from the Middle Balsas Basin, Guerrero, Mexico; *a*, stirrup handle; *b*, vessel spout; *c*, typical spindle whorl; *d*, fragment of a pipe bowl; *e*, *f*, pipe, side and top views; *g*, loop leg; *h*, figurine; *i*, typical projectile point; *j*, spiral stemmed pipe.

ARTIFACTS OTHER THAN POTTERY VESSELS

Stone

Single flake obsidian knife blades were numerous at every site. Black obsidian was used mostly; however, at Coyuca some dark green obsidian was employed.

Projectile points did not exhibit a great deal of workmanship. Typical points were made by reworking obsidian knife blades. They averaged an inch in length and one-half inch in width. Both side-notched and side- and basal-notched types were manufactured. The latter type predominated. A few large triangular shaped points were noted in the Huetamo district. Projectile points were most numerous in the eastern part of the Basin.

Metates were found over the area and were nearly always of vesicular basalt. The legless trough type was most common. However, the tripod-legged variety was noted at Coyuca. Manos were of medium size, rectangular with rounded corners, and of igneous material. A few small basalt pestles were found.

Celts occurred over the entire area. A few all-around and three-quarter grooved axes were noted in the west. A stone fiber beater was found at Coyuca. It was rectangular with rounded corners and had a groove around the edge for hafting. The working surface had parallel striations. It measured three inches by two and a quarter inches by one inch.

Stone figures, or idols, were noted in several collections. They usually were crudely done.

[32] Moedano, 1941, p. 25, Fig. 1 (14).

Green stone beads were collected at many of the sites.

Terra Cotta

Pipe fragments were found at only one site, Coyuca (El Respaldo, site 24), and there they were quite numerous. All together eighteen stem pieces and one bowl fragment were recovered. They were all collected on the surface of the site. This is another example of Tarascan influence in the Middle Balsas Basin; the pipes are similar to a Type A described and pictured by Moedano from Tzintzuntzan.[33] Similarity between the Coyuca pipes and the Tarascan pipe is seen in the style of the bowl, spiral and cylindrical stems, and the placing of two small legs beneath the bowl (Fig. 6, *d*, *e*, *f*, *j*). In the Coyuca collection there are sixteen cylindrical or oblong shaped stems, and two spiral stems. Stems were flattened toward the bit end and had a circular enlargement to which the bowl was attached at the opposite end. White and red slips were applied to the pipes. Several examples had an incised design around the stem. No complete stems were recovered, so their length is unknown. However, there appeared to be two types of stems, one rather short and heavy and the other long and thin.

Spindle whorls were mainly of a utilitarian type. The great majority of them were made of tan or red clay, were unslipped, conical in shape, and had no decoration. They averaged three-fourths of an inch in diameter. A few specimens had incised designs, but they were rare.

The area certainly lacked a figurine complex. One very badly weathered example was found at San Miguel Totolapan. It was made of heavily tempered tan clay and represented a female figure wearing ear ornaments (Fig. 6, *h*). It may have been worn as a pendant since two holes through the upper part of the body appear to have been made so that the figurine could have been suspended on a cord. A figurine found by Osborne in the Huetamo area was said to be a "gingerbread" type, but it was so weathered that its finer outline could not be determined.[34] A small animal effigy head was found at Zirándaro. It resembled a fox.

One flat stamp-type seal was found at Coyuca.

Shell

Ornaments made of shell were not nearly as numerous along this part of the Balsas as they were farther down river. As would be expected, worked shell occurred with greater frequency as one neared the Pacific. A few shell ornaments and bits of shell were found over the area, with their greatest concentration appearing at Coyuca. A piece of a bracelet made from a *Cardium* shell was collected at Coyuca. *Conus* shells were used for beads, and there is one large tubular bead made of an unidentified shell. Bits of Nacreous shells were found at several sites. Spinden[35] reported a number of shell beads and shells associated with a burial at Placeres del Oro.

Metal

Although these parts of Guerrero and Michoacán were famous in prehistoric times for their tribute of copper and gold to the Tarascans and Aztecs, very few metal objects were obtained or examined in our survey. Copper celts and bells were seen in collections, and an awl-like implement of copper was found at San Miguel Totolapan. The awl-like implement is seven inches long and three thirty-seconds of an inch wide. The sides are square and the ends pointed.

CARVED STONE

Occurrences of carved stone centered about the Mexiquito-Zirándaro area (sites 3 and 5) in the western part of the Basin. One specimen, however, was seen on Cerro de Aguila (site 30).

This specimen was an oblong stone three and one-half feet long with a stylistic representation of a serpent carved on one end. It apparently had been set into the face of a platform or building.

Osborne has described and illustrated the stelae and carved heads from San Augustin, near Zirándaro, Santiago, and Mexiquito.[36] Spinden and Hendrichs give illustrations and descriptions of heads and carved stone slabs from Placeres del Oro (site 16).[37]

Since the stelae and stone carvings have been ably described by the above mentioned individuals they will not be considered further in this article. For full descriptions see the references in the footnotes. Osborne has pointed out a

[33] Moedano, 1941, p. 37, Fig. 6.
[34] Osborne, D., 1943 p. 63.
[35] Spinden, 1911, p. 33.
[36] Osborne, D., 1943, pp. 67–70.
[37] Spinden, 1911; Hendrichs, 1945, pp. 219–20.

similarity between the Balsas stone carving and certain objects from Central America.[38]

BURIALS

Burials were observed at several places in the Middle Balsas Basin. At El Tamarindo (site 40) a burial was found beneath a low rock covered mound, evidently a former house site. It looked as though the bones had been placed below the floor of the house. The bones were quite fragmentary but did not appear burned, although a layer of ash was seen about one foot below the surface. The burial position could not be determined since the bones had been disturbed by treasure seekers. One incisor tooth was found that had three superficial grooves made in the enamel. This type of tooth mutilation is discussed by Borbolla and called type F.[39] It has also been found at Monte Alban in Oaxaca.

The burial found just to the side of the mound at San Miguel Totolapan (site 31) consisted of bits of long bones and skull fragments, and an urn containing calcined bones. As was mentioned previously, this may represent a cremation in which the burned remains were placed in the urn and the unburned pieces of bone buried along with it, or it may have been two burials—a cremation and an interment. Associated with the remains in the urn were a few calcined bird bones, suggesting a sacrifice at the time the body was cremated. At the same site an area believed to be a cremation platform was exposed in one of our trenches. Upon it were ashes, bits of bone, and artifacts.

At Placeres del Oro (site 16) William Niven found a cremation that was described by Spinden.[40] There, the cremated remains were placed between elaborately carved stone slabs. Spinden believes that this was a partial cremation and that the remains were buried while still smoldering. A number of funerary offerings accompanied the burial.

Armillas[41] found a burial at Amuco (site 25) in which the body had been placed in the ground, resting on its side, and about its head several red pottery vessels had been grouped.

Some evidence points toward the practice of funeral rites in which the corpse was at least partially cremated before burial. The cremated remains, together with unburned portions of heavy bones, were buried together. Sometimes the calcined remains were placed in funerary urns, or in other cases, they were buried directly in the ground. Other evidence is for simple imhumation below house floors or in the ground.

SUMMARY AND OBSERVATIONS

The aboriginal population of the Middle Balsas Basin must have been quite large. Cervantes de Salazar speaks of the natives as being "as thick as bees" when he wrote of the region during the period 1558–67.[42] The great number of archaeologic remains certainly furthers this point of view; however, we have no way of knowing whether or not all of the sites were occupied at one time until additional excavations are undertaken.

The people were agricultural and gathered together in villages. Houses apparently were similar to those in the area at present, i.e., *jacal* structures with walls or wall foundations of rock. Some villages seem to have been built around courts or plazas.

Large religious or secular centers are indicated by imposing sites made up of great pyramids and platforms. These bases for buildings that were probably of a more temporary nature were frequently faced with shaped stones and impressively coated with white plaster.

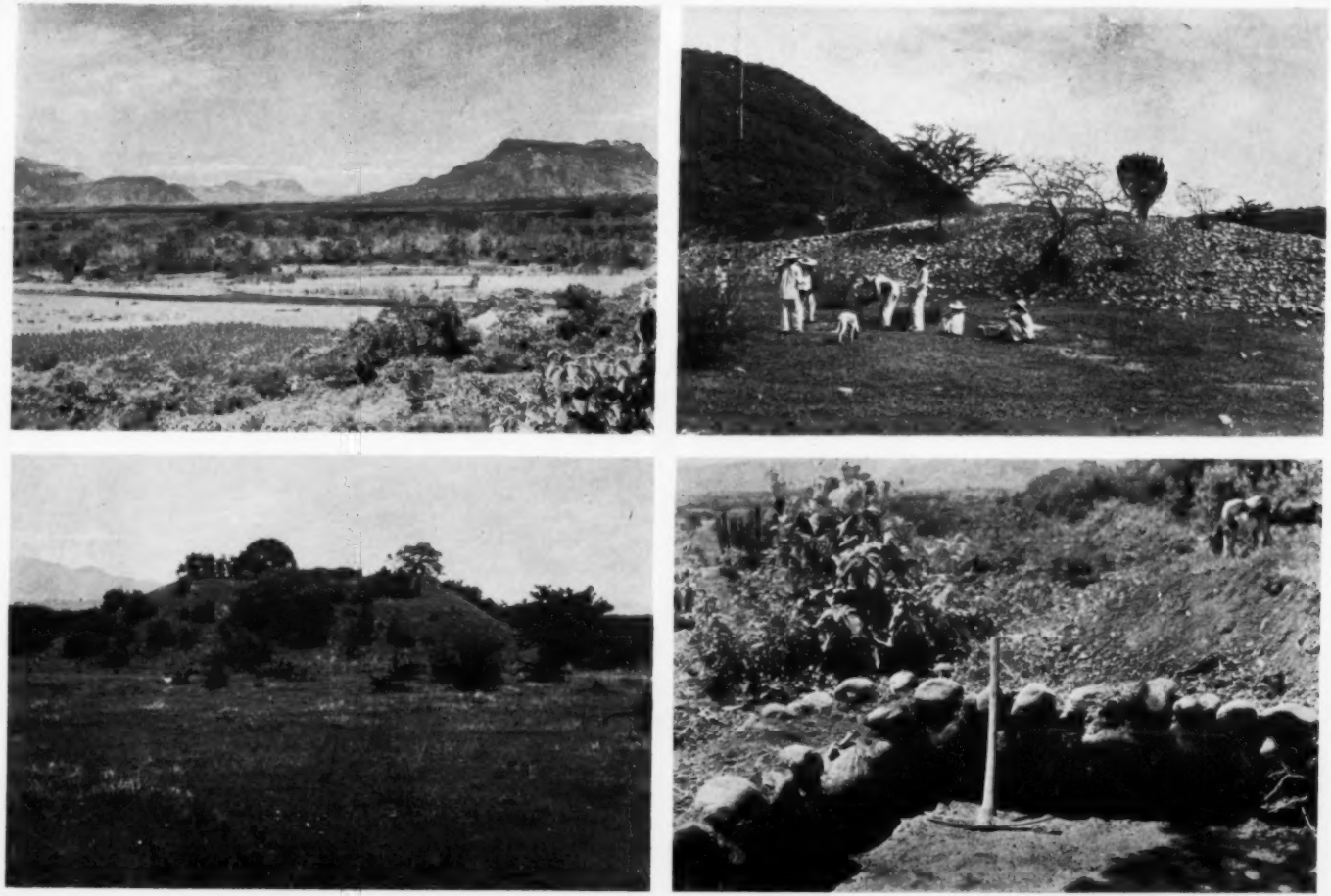
Defensive sites or forts are suggested by other groups of pyramids, platforms, and terraces on hills and promontories overlooking and commanding the Río Balsas.

Pottery wares present a very plain picture when considered as a whole. The great majority of sherds are Balsas Red, Coarse and Balsas Red, Fine. All wares are badly weathered. This factor has caused most of the designs to disappear from decorated sherds since their slips are unusually soft. From stratigraphic and distributional studies of potsherds, the following observations were made:

1. Balsas Red, Coarse and Balsas Red, Fine were found over the entire area and were used throughout the period of occupation. They were employed as the common cooking, serving, and storage wares.

2. Zimatepec Black-on-White was found only in the eastern part of the Basin and extended northeastward almost to Teloloapan, Guerrero. This ware may have been made by the Chontals or the Cuitlatecos who occupied this area at one time. The practice of making loop-shaped legs for tripod vessels of this ware was unique in this area.

[38] Osborne, D., 1943, p. 72.
[39] Rubin de la Borbolla, 1940, p. 359.
[40] Spinden, 1911, p. 33.
[41] Armillas, 1945, p. 83.
[42] Cervantes de Salazar, 1914, p. 11.



The Middle Balsas Basin, Guerrero, Mexico: *upper left*, general view; *upper right*, stone-covered mound; *lower left*, truncated pyramid; *lower right*, house remains.

Large copper bells from (*a–d*) a pre-Columbian ruin near Mammoth, Arizona and (*e*) the Tarascan culture, Michoacán, Mexico. *a*, photomicrograph (100 diameters) of unetched copper in the Mammoth bell, showing crystal structure; *b*, photomicrograph (400 diameters) of unetched copper in the same bell, revealing undistorted spherical sulphide inclusions at crystal interfaces; *c*, side view of the Mammoth bell; *d*, top view of the same. *c*, *d*, 6/7; *e*, natural size. *a*, *b*, courtesy, B. H. McLeod; *e*, courtesy, Daniel F. Rubin de la Borbolla, National Museum of Mexico.

The legs were shaped exactly like lugs but were placed on the bottoms of bowls as supports (Fig. 6, *g*). Vessels with loop legs still are made in the Zumpango del Río part of Guerrero.

3. Chandio White-on-Red extended from San Miguel Totolapan westward. The same ware was found near Apatzingán, Michoacán, and the implication is that it has a continuous distribution from the Middle Balsas Basin to the Apatzingán area. But this has not been tested. It occurred only in upper levels and may have been of Tarascan origin.

4. La Huisachal Orange was found to be the most numerous in lower levels at Coyuca.

5. A red-on-tan ware found only at San Miguel Totolapan may be a Cuitlateco type since that area was a Cuitlateco center.

Obsidian was utilized for projectile points and knife blades. Igneous rocks were employed in the making of metates, manos, and pestles. The legless trough type metate was dominant. Green stone beads were used as ornaments, as were objects made of shell such as bracelets, beads, and pendants. No applique sets of shell such as were common in the Tepalcatepec Basin were found. No turquoise ornaments were recovered. An absence of bone artifacts was also noted. Celts were more frequently used than were axes.

Clay pipes were of a type found at Tzintzuntzan, Michoacán. The making of vessels with spouts and stirrup handles were other traits that have parallels with material from Tzintzuntzan. Spindle whorls were simply made and appeared to be strictly utilitarian in nature. Figurines were very rare in the area, only two being found during the reconnaissance.

Metal objects were rare despite the fact that early documents assign great importance to the area as a source for various metals.

Only in the Mexiquito-Zirándaro and the Placeres del Oro areas did the art of carving stone reach a high level. There, large stelae, heads, stone vessels, and slabs to accompany burials were well made.

In disposing of the dead both cremation and inhumation were practiced. Graves might contain funerary offerings or they might only consist of skeletal remains. Ashes and bones from cremations were sometimes placed in urns.

Evidence for the Tarascan occupation is believed to have been found in the western part of the Basin. This influence apparently reached the area from the Tepalcatepec Basin to the west. However, it is likely that there was more than one route over which influence could have spread. The Tarascan influence is evidenced by Chandio White-on-Red pottery, pipes, vessel spouts, and stirrup handles. Goggin[43] sets up a Chandio complex in the Tepalcatepec Basin characterized by Chandio White-on-Red ware, an abundance of pipes, walled platforms, and cobblestone mounds. He says that "teapot" shaped vessels (with spouts) have been found associated with this complex. This certainly appears to be the same complex that shows up in the Middle Balsas Basin, especially at Coyuca. The similarity of pipes, vessel spouts, and stirrup handles from the Balsas with those from Tzintzuntzan has already been shown. It is logical that this Tarascan influence should show up strongly at Coyuca since that site was reputed to have been an important Tarascan colony after 1460.

Zimátepec Black-on-White occurs at Coyuca in the same levels with Chandio White-on-Red, pointing to a contemporaneity of the Cuitlateco or Chontal, whichever were the makers of the ware, with the Tarascan occupation.

No Aztec Black-on-Orange pottery was found in the reconnaissance. This may imply that although part of the area was conquered by them during Ahuitzotl's time (1486–1502), there was no real attempt at colonization. Garrisons and forts were set up but may have been manned principally by local groups dominated by the Aztecs. Perhaps a few Aztec warriors were left behind to keep order and exact tribute, but materially the culture of the local groups was unchanged. A short distance to the north, around Teloloapan, Guerrero, Aztec colonies were established and there Aztec wares were commonly found.

It is evident that the majority of the sites in the Middle Balsas Basin belonged to groups earlier than the Tarascans and Aztecs. Many sites present indications of considerable age in the amount of detritus covering the structures and in the occurrence of several building periods.

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[43] Goggin, 1943, pp. 56–7.

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Cambridge, Mass.
November, 1946

EDGAR LEE HEWETT

REGINALD FISHER

WE ARE called upon to record the loss of one of the last of the "early greats" in American Archaeology, Edgar Lee Hewett, who took his eternal place on December 31, 1946 with his illustrious contemporaries in the science—Lewis H. Morgan, Frederic W. Putnam, J. Wesley Powell, William H. Holmes, J. Walter Fewkes, Adolf F. Bandelier, Alice C. Fletcher, and Charles F. Lummis. Philosopher, teacher, world traveler and explorer, Doctor Hewett leaves an enviable record which includes: the founding and direction for thirty-seven years of the Archaeological Institute's School of American Research; the establishment of departments of anthropology in two leading universities (University of New Mexico and University of Southern California); the building of two important museums (Museum of New Mexico and San Diego Museum); the development and training of several distinguished professional archaeologists; and the endowment of "The Humanities" with numerous essays, papers, and books comprising more than two hundred titles—archaeological, philosophical, sociologi-

cal, historical, and pedagogical—readable yet scholarly.[1]

Born in Warren County, Illinois on November 23, 1865, Dr. Hewett received his elementary education in the country schools. He obtained the baccalaureate from Tarkio College in Missouri, and the Master of Pedagogy from the Colorado State College of Education, Greeley. His Doctorate in Archaeology was earned at the University of Geneva, Switzerland. Among the many honors which had been conferred upon him—a full list may be found in the 1947 edition of *Who's Who in America*—he cherished most the Doctor of Laws from the University of Arizona, the Doctor of Humane Letters from the University of New Mexico, and Doctor of Science from Knox College, Missouri.

Dr. Hewett was essentially a humanist, not only inasmuch as his work lay in the Humanities, but in his adherence to the principle of the supreme value and self-perfectibility of human personality. This was almost an article of religious faith with him. His autobiographical *Campfire and Trail* substantiates this in numerous statements. For example: "The teaching of anthropology is a serious business: You are interpreting *man*. The obligation upon you is to find out and make known the *truth* about him. . . . I am willing that this should be placed at the top as the first principle in all my teaching of the Sciences of Man—'Man is always better than he seems' " (p. 126). Or speaking of what he calls the pillars of his faith, he specifies among others, "Humanity striving for freedom, for perfection, by trial and error, with some permanent gain in every age" (p. 181). And further he says, "Believing as I do in the divinity of all men, I never set the Galilean Peasant (Christ) out from and above all others. I see Him among men a quiet force that none need hesitate to try to emulate, something attainable to all humanity . . . " (p. 59). This philosophy pervades much of Dr. Hewett's writings and it was the sympathetic approach it gave his teachings which so endeared him to his many students.

While atheism was foreign to Dr. Hewett's philosophy, he subscribed to no institutional form of religion. In outlining his faith in *Campfire and Trail* he says he believed that life is the expression of the Infinite mind; that Man was created in the eternal Image and shares in the creative process; and that Christianity is the highest expression of religion though not with a monopoly of Truth.

Once, when asked for a biographical statement, Dr. Hewett summarized his life as follows: "For 14 years I was a farm boy, working out a little elementary education as best I could; for five years I did my best to get a high school and college education; for 19 years I was teacher, student-amateur archaeologist and explorer; and the rest of the time has been divided between excavation trenches, classroom and trying to round out my acquaintance with the world." This typifies his essential modesty, which occasionally misled some—to their inevitable regret—to cross his will. Few human beings as "tough-willed" as Edgar L. Hewett will be met.

No great man has ever been without friends or lacked opponents. Dr. Hewett was no exception. However, let it be said at once that even his opponents admired and respected him.

In a sense Doctor Hewett lived a circumscribed life—self-circumscribed, that is, by his consuming interest in his chosen work. Nothing else could have more than second claim upon his time and energy. The School of American Research held first priority and he devoted the best that was in him to it—even foregoing many of the recreations and pleasures considered essential by less resolute individuals. Nevertheless he was highly personable, and took great delight in the discussion of human affairs or world problems—of which he was a profound student—with groups of friends. Membership in a number of well-known clubs which he fondly maintained—among them, "The Ten Dons" of Albuquerque, the Cosmos Club of Washington, D. C., and the University Club of San Diego—bears this out.

Doctor Hewett's fame was international, and American Archaeology owes him a lasting debt for the world-wide esteem he won for it, in many lands, during his extensive travels.

Museum of New Mexico
Santa Fe, New Mexico
April, 1947

[1] A bibliography of Dr. Hewett's works is being published in the *American Anthropologist*, N.S., Vol. 49, pp. 260ff., Menasha, 1947.

FACTS AND COMMENTS

A LARGE PRE-COLUMBIAN COPPER BELL FROM THE SOUTHWEST

Pre-Columbian copper in the ruins of the Southwest occurs chiefly in the form of bells, numerous examples of which have been illustrated in the literature. Generally these are of the "hawk's" or "sleigh" bell type, characterized by a spherical or pear-shaped resonator, free clapper, and an eyelet for suspension. In diameter they range from about 10 to 40 millimeters and, on the whole, are devoid of any ornamental features. Exceptions to this, of course, have been found, notably a few small bells with "wire work," the effigy bell noted by Fewkes,[1] and the large Delgar Ruin bell described by Hough.[2] Since the larger examples are apt to display complicated technical and ornamental treatments, more can be done with these than with the small bells by way of pinning down their origins to centers where the metallurgist's art flourished. This is a subject of continuing interest because little convincing evidence has been adduced to support the idea that the Hohokam or Anasazi ever knew the art of copper casting. Southwestern copper objects are commonly referred to a Mexican source.[3] New discoveries which shed further light on this problem are therefore worthy of attention.

In January, 1945, a bell of mammoth proportions was found, coincidentally, near Mammoth, Arizona. The discoverer of this bell, Mr. Scott Ramsey of Oracle, Arizona, generously presented it to the Arizona State Museum shortly thereafter. The circumstances related to its finding are as follows: Mr. Ramsey's interest in ruins took him frequently to one situated on the south bank of the San Pedro River, five miles southeast of the old mining town of Mammoth. This ruin was undergoing severe erosion which was dissecting rooms and trash deposits and exposing, from time to time, a variety of cultural objects. On one of these jaunts the bell, illustrated in Plate IX, *c–d*, was found; but being of metal and quite smashed Mr. Ramsey all but dismissed it as a battered copper float from a modern toilet tank. Except for the alertness of a companion that day, Mrs. Alice Carpenter also of Oracle, the bell might again have been lost. Mrs. Carpenter recognized the form of the object as agreeing with bells she had seen illustrated in archaeological reports and through her efforts it was referred to the writer.

A visit to the site and limited testing brought out the following additional points: The spot where the bell was found proved to be a trashy deposit within a room. Assuming that the bell was in its original resting place, one finds the suggestion that it was thrown away with rubbish in an abandoned room. It lay well above the floor of the room and was not associated with other objects, as in a cache, or with a burial. That so rare an object, made of material unique in the culture, should have been disposed of at all is curious; but its battered and flattened condition, quite obviously willfully done, may be a clue to feelings on the part of the owner who wished to free himself of something which may have brought him ill-luck.

The ruin, listed in the Arizona State Museum survey as Ariz. BB:6:2, is representative of a large class of villages jointly occupied by the Hohokam on the one hand and by the Saladoans of Pueblo extraction on the other. The many score rooms, scattered over several acres, are both of the pueblo type of construction, common among the Saladoans, and the shallow pit houses of the Hohokam. Cremations and inhumations have appeared through erosion, further reflections of the traditional burial customs of the two groups. The pottery types, constituting the most important criteria for establishing dates for the village, are: Tanque Verde Red-on-Brown, San Carlos Red-on-Brown, Gila Polychrome, Gila Black-on-Red, Tucson Polychrome, a late form of corrugated ware, Sells Red, San Carlos Red, and the local plain brown ware. All of these types may be assigned to the fourteenth century although a few of them doubtless were in existence somewhat earlier. Several sherds of Roosevelt Black-on-White and a late form of polychrome, allied to Pinedale Polychrome, were also seen, suggesting an occupational range of about 200 years, from A. D. 1200–1400.

The bell then may be dated to this period; but because it came from late trash, i.e., fourteenth century, this date may be taken as the time reference to its latest use, not necessarily the date of its appearance in the site.

Coming now to the bell, we find that its damaged condition prevents accurate measurements of length and diameter. The gross dimensions are therefore approximate for the bell in original form, while the lesser metrical data are precise:

Length, excluding loop eye: 100 millimeters.
Maximum diameter: 60 millimeters.
Weight: 295 grams (a probable 25 grams should be added to account for lost parts).
Loop eye: U-shaped; rises 15 millimeters above top disc and is cast as an integral part of same; width at points of junction, 32 millimeters; bar round in section, 5 millimeters in diameter.
Top disc: diameter including bead, 48 millimeters; surface shows spiral "wirework" effect (Pl. IX, *c*)
Decorated collar: width 24 millimeters; pattern in low relief of opposed triangular units, each filled with oblique parallel lines resulting from the original wax strips.
Fillet at lower edge of decorative collar: diameter, 3 millimeters; flattened.
Furrow: below decorative collar; width, 10 millimeters; depth, 1 millimeter.
Resonator:
Slit: approximately at right angles to axis of loop eye; extends upwards to within 10 millimeters of furrow; width, 5 millimeters.
Thickness of walls: lips of slit, 2 to 3 millimeters; elsewhere, 1 millimeter, thickening gradually towards collar.
Clapper: none found.

At several places on the resonator where the patina has been freshly broken away, exceptionally bright yellowish

[1] Fewkes, 1904, p. 50.

[2] Hough, 1914, Fig. 79.

[3] This reverses an earlier position stated in Gladwin, Haury, Sayles, and Gladwin (1937, p. 164), to which I no longer subscribe. Metallurgists are emphatic in their statements that there is too much variability in the copper of any one region to allow copper to be traced to the source with certainty. The reference of Southwestern copper objects to a Mexican source rests, therefore, upon the abundance of objects, both in kind and variety in that area, and upon the absence of all by-products of casting, imperfect castings, and relatively few specimens in the Southwest. See also Ekholm, 1942, pp. 99–100.

surfaces suggested the possibility of gold plating. Mr. B. H. McLeod,[4] advised of this, undertook a determination to prove or disprove the point. He reports: "I very carefully removed a part of the copper that appeared to be plated and ran a micro test for gold and could not find a trace. The film that makes the copper appear to be gold plated is infinitely thin and dilute hydrochloric acid will remove it the instant it comes in contact with it."

A partial metallurgical test[5] of the metal gave the following results:

Gold	None
Tin	None
Silver	0.059 per cent (17.2 ounces per ton of copper)

Dr. William C. Root of Bowdoin College, Brunswick, Maine, reports that a spectographic analysis indicated the metal to be pure except for the following elements:

Iron	Less than 0.1 per cent
Silver and lead	Less than 0.05 per cent
Arsenic, antimony, bismuth, tin	Less than 0.01 per cent

Root further states, quoting his technician,[6] "The chief impurity is oxygen revealed as cuprous oxide under the microscope."

At our present state of knowledge these analyses offer no clues as to the possible place of origin of the copper.

The process employed in manufacturing bells of this type has been certainly identified by both macroscopic and microscopic means as the "lost wax" or *cire perdue* method of casting. Mr. B. H. McLeod has presented technical discussions on this point.[7] His microscopic analysis of this bell shows the normal crystal structure of cast copper of the sulphide type. Plate IX, *a* illustrates this characteristic and the general distribution of the sulphide inclusions (dark spots) at the crystal interfaces. Plate IX, *b*, a microphotograph at 400 diameter, further amplifies the sulphide inclusions. Their round, undistorted form definitely rules out hammering as a technique in fabricating the bell. Mr. McLeod further reports that "a number of the inclusions were removed completely free from the metallic copper and a micro test run on them for sulphur and copper. The presence of both elements was proved." The recognition of both the oxide constituent by Fink and the sulphide by McLeod poses a metallurgical problem on which I can shed no light.

It should be noted that Mr. McLeod's tests on six bells from Gila Pueblo ruin, two from Culiacán, two from Guasave,[8] and now the Mammoth bell show them all to be of the sulphide copper type, suitable for casting, in contrast with the oxide type, which lent itself to the hammering technique.

Apparently large bells of the class shown here are the exception in both the Southwest and Mexico. Locally, the Delgar Ruin bell[9] most nearly approaches the present specimen in size and style, all features being present except the furrow below the decorated collar. Details concerning fragments of other large bells, found at Pueblo Bonito and Pueblo del Arroyo by Judd and earlier by Pepper, are not generally available as yet, but information furnished by Judd to Mrs. Allison C. Withers[10] indicates a number of similar features.

For Mexico, so little published material exists that meaningful comparisons cannot be made. This is especially true for the Tarascan area in Michoacan and Jalisco, one of the presumed centers of the metallurgist's art, strategically located for trade with the southwestern United States. At Culiacán, Kelly[11] inclines to believe that copper objects were produced locally which, if so, would have provided a much nearer source, while for Guasave, farther to the north and west, Ekholm[12] leaves the question open. At the above two named places, 153 copper objects were recovered, a figure which is not far below the total number of bells from the Southwest. Yet no large bells were included in the two lots, which may be taken to mean a still more southerly origin must be sought.

A possible clue has been provided by Dr. Daniel F. Rubin de la Borbolla of the National Museum of Mexico who kindly supplied a photograph (Pl. IX, *e*) and data concerning a bell from Michoacan assigned to the Tarascan culture. This bell (No. 22–27, National Museum of Mexico) is 80 millimeters in length and 53 millimeters in diameter, weighing 142 grams. Except for its reduced size, it is a remarkable duplicate of the Mammoth specimen. The orientation of the loop eye with respect to the slit; the spiral top; the beading, fillet, and furrow; and the ratio of the space devoted to the decorative collar to the rest of the resonator, are essentially the same in both examples. Stylistically they are one. Assuming the Michoacan bell to be indigenous to that area, we may conclude that the Arizona bell hails from the same part of Mexico. Dr. W. C. Root, however, believes the bell may have come from the east coast of Mexico, judged on resemblance between this bell and those found by Ekholm at Panuco, Vera Cruz, and by Strong in the Bay Islands, Honduras.

Obviously, what is needed before we can reach sound conclusions is a systematic study of pre-Columbian copper working in Mexico. In this the contributions of the metallurgist, the spectroscopist, and archaeologist must be combined. Once regional styles, sequences, and metallurgical data have been established for the various metal-working centers of Mexico, we shall know where to look for the source of trade copper objects which reached the Southwest. The ability to date the latter with relative accuracy will favor Mexico in supplying time-markers for local chronologies. The effects of this may, in fact, extend so far ultimately as to aid in the correlation of the Mayan and Christian calendrical systems.

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[4] Research Metallurgist, Inspiration Consolidated Copper Co., Inspiration, Arizona.

[5] By Professor J. B. Cunningham, Department of Metallurgy, University of Arizona; 18 grams of copper, taken from the damaged side were sacrificed for this test.

[6] Prof. Colin E. Fink, Department of Metallurgy, Columbia University.

[7] In Gladwin, Haury, Sayles, and Gladwin (1937, pp. 278–281); and in Kelly (1945, 180–186).

[8] 1945, p. 183.

[9] Hough, 1914, p. 37, Fig. 79.

[10] Withers, 1946, pp. 9–11.

[11] Kelly, 1945, p. 149.

[12] Ekholm, 1942, p. 99.

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A NOTE ON THE MAYA VENUS TABLE

To permit the entire six Dresden codex pages 24, 46, 47, 48, 49, 50 to be seen within the purview of a single page, the Gates restoration is here photographed together with a partial translation (Fig. 7). This facilitates following the procedure detailed on pages 94–8 of "Maya Astronomy" by Dr. John E. Teeple[1] and on pages 209–13 of "Astronomical Tables of the Maya" by Dr. Maud W. Makemsen,[2] for predicting the four Venus phase limits; and is intended to supplement the writer's discussion on pages 35–8 of AMERICAN ANTIQUITY (Vol. XII, July, 1946).[3]

The English rendering of Maya day names and month names may assist the student unfamiliar with these particular hieroglyphs in the original manuscript. Where found more convenient, Arabic decimal numbers have been used to replace the bar fives and dot ones of the Maya vigesimal notation. Continued study however makes it quite as easy to think in the original units, $\frac{1}{1}$, $\frac{1}{20}$, $\frac{1}{18}$, $\frac{1}{9}$, representing the Venus phase length formula, as to think in our customary decimal numbers, 236, 90, 250, 8. For simplification, the midline summations through the five successive pages have been shown only in decimal numbers, beginning on the left of page 46 with 236 and ending on the right of page 50 with 2920. On the summary, page 24, the successive multiples 1–13 of 2920 are shown in both number systems.

The four numbers D2, E2, F2, and G2 in the fourth row from the bottom of page 24 proved troublesome to some commentators. Dr. S. G. Morley stated that they are "an interpolation of some kind, and the explanation offered by Professor Förstemann that the first and third terms and the second and fourth are to be combined by addition or subtraction, leaves much to be desired."[4] "Otherwise they seem to be without rule [wrote Dr. Förstemann[5]] and they give one somewhat the impression of a subsidiary computation such as one might jot down on a slip of paper in the course of some important mathematical work." Dr. Teeple noted that they might be used to bridge the inerval between the 1 Ahau 18 Kayab basis and the 1 Ahau 18 Uo basis. "We have to deal with three distinct Venus tables and we must explain the other two rows" not only the one line of month positions ending in 1 Ahau 18 Kayab.[6]

Although it does not appear in the original Dresden Venus table, a 1 Ahau 18 Uo ephemeris has here been added to facilitate calculations. The calendar round combination 1 Ahau 18 Uo occurs but twice, once in the bottom line of page 24 and once at the end of cycle 57 of the 18 Kayab ephemeris. Doubtless the 584-day cycles were counted from left to right, as indicated by the hand-knife symbols, in horizontal lines; one cycle per page and across five pages, a total of 5 cycles per line; and then progressing down the page through 13 lines. Thus $5 \times 13 = 65$ cycles exactly filled 2 calendar rounds. Hence the same table could continue to function repeatedly as long as it kept within allowable limits of error.

This limit was prescribed by the shortest phase length of 8 days. Heliacal rising in the east 4 days after inferior conjunction marked the cycle datum. This recurred at intervals of from 580 to 587 days but the mean cycle length was 584. The precise mean is now known to be 583.92 or 0.08 days short of the even number used in the prediction table. If uncorrected the table error accumulates $65 \times 0.08 = 5.2$ days in 104 years (two calendar rounds). If allowed to exceed 8 days the planet might appear in the wrong phase, in the zone presided over by the god of the west instead of appearing within the 8 days zone limits presided over by the god of the south.

Teeple observed that $57 \times 584 = 4.12.\ 8.\ 8$ while the number F2 is 4.12. 8. 0. An 8-day correction is therefore ef-

[1] John E. Teeple, "Maya Astronomy," *Contributions to American Archaeology, Carnegie Institution of Washington*, Vol. 1, No. 2, Washington, 1930.

[2] Maude W. Makemsen, *Astronomical Tables of the Maya*, 1943.

[3] Robert H. Merrill, "A Graphical Approach to Some Problems in Maya Astronomy," AMERICAN ANTIQUITY, Vol. XII, pp. 35–46, 1946.

[4] S. G. Morley, "Introduction to Maya Hieroglyphs," *Bulletin, Bureau of American Ethnology*, No. 57, Washington, 1915, p. 277.

[5] Ernest Förstemann, "Commentary on the Maya Manuscript in the Royal Public Library of Dresden," *Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University*, Vol. IV, No. 2, Cambridge, 1906, p. 111.

[6] John E. Teeple, *ibid.*, p. 95.

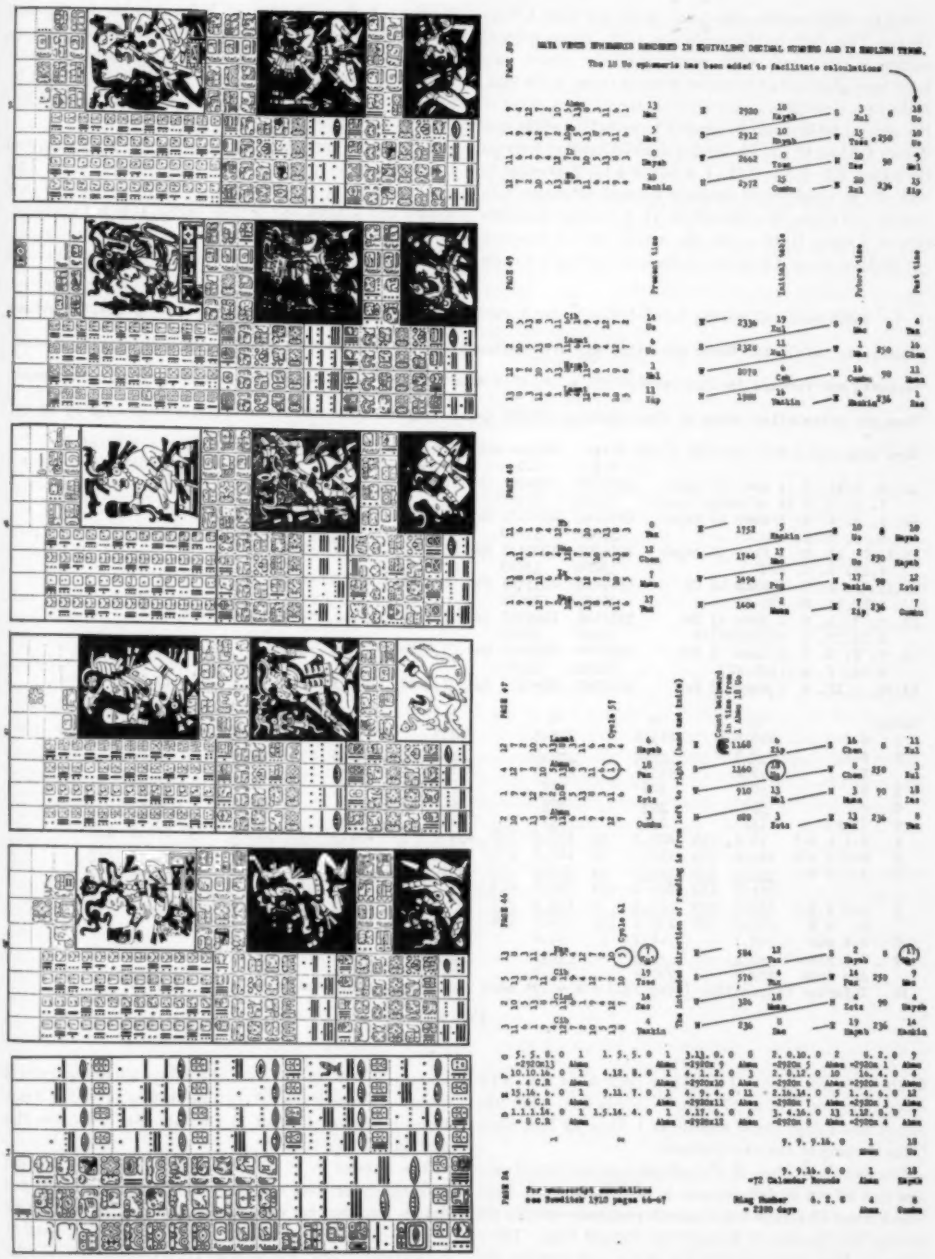

FIG. 7. Gates restoration of the Dresden codex, pages 24 and 46–50, with a partial translation.

fected by renewing the cycle count on the new basis 1 Ahau 18 Uo. This date in the prediction table marks heliacal setting in the west, while presumably the planet may have been observed at or nearer heliacal rising in the east. If the 18 Kayab table is outmoded another century of use of the general table would be secured by switching to the new datum 1 Ahau 18 Uo. He further derived another interval by taking E2−F2 or 9.11. 7. 0 minus 4.12. 8. 0 equal to 9.18. 17. 0, which could similarly be used in conjunction with 61 full cycles, 61×584=9.18. 17. 4, to effect a correction of 4 days. In 61 cycles the actual error is 61×0.08 =4.88 days, hence if a switch is made at the end ot a cycle is about 4 days ahead, and heliacal rising in the east actually falls on or near 1 Ahau 3 Xul. This ephemeris occupies the lower position because it applies to future time. Still another century of use may then be secured by switching to a new table at the end of cycle 61 of the 3 Xul table.

Only one of the Venus glyphs lacks the knife sign, and this appears on page 47 above the number 1168. This marks the point at which the 18 Kayab table was outmoded and 1 Ahau 18 Uo table began. It is not unreasonable to count backward and forward in time from this date. The table with the above mentioned switches to alternate

Venus heliacal rising date, 4 days after inferior conjunction as computed from tables by P.V.Neugebauer "Gendherte Tafeln für Sonne und Planeten" Astronomische Nachrichten 248:161 Kiel 1933. Maya intervals counted backward and forward in time from 10.15. 4. 2. 0 1 Ahau 18 Uo with Julian calendar dates accepting Goodman-Thompson correlation value of Ahau equation 584285 days. Compared with Willson's table,Spinden 1930 pp 82-87.

Maya long count and calendar round dates	M.D.	Julian calendar dates J.D.	A.D.	Age Days	Error	Key	Willson's J.D. of Heliacal Rising
10. 0. 0.14. 0 1 Ahau 18 Kayab	1440280	2024565	Dec.16, 830	289.7	+6.3	A	2024571
5. 5. 8. 0 (2 calendar rounds	37960	37960					
10. 5. 6. 4. 0 1 Ahau 18 Kayab	1478240	2062525	Nov.20, 934	295.9	+0.1	B	2062525
5. 5. 8. 0 =G1	37960	37960					
10.10.11.12. 0 1 Ahau 18 Kayab	1516200	2100485	Oct.25,1038	301.8	-5.8	C	2100479
4.12. 8. 0 =F2	33280	33280					
10.15. 4. 2. 0 1 Ahau 18 Uo	1549480	2133765	Dec. 6,1129	296.8	-0.8	D	2133764
4.18.17. 0 =E2-F2	35620	35620					
11. 0. 3. 1. 0 1 Ahau 13 Mac	1585100	2169385	Jun.15,1227	299.2	-3.2	E	2169381
4.18.17. 0 =(61x584)-4	35620	35620					
11. 5. 2. 0. 0 1 Ahau 3 Xul	1620720	2205005	Dec.23,1324	299.1	-3.1	F	2205003
4.18. 7. 0 (E2-F2)	35620	35620					
11.10. 0.17. 0 1 Ahau 18 Pax	1656340	2240625	Jul. 1,1422	301.3	-5.3	G	2240619

Table		A		B		C		D		E		F		G	
1	S-1	269.5		243.7		218.7		261.3		91.0		280.0		107.6	
2	S-2	-0.3		-0.2		-0.2		-0.0		-0.5		+0.2		-0.3	
	S	269.2		243.5		218.5		261.3		90.5		280.2		107.3	
3	R	505		505		507		505		519		505		519	
8	r	368		369		370		368		375		368		375	
9	(R-r)	137		136		137		137		144		137		144	
4	A-1 & M-1	78.2	136	400.1	35	138.0	158	459.9	57	197.9	180	519.8	79	257.7	202
5	A-2 & M-2	446.4	171	155.7	60	448.8	172	81.4	31	518.3	199	7.2	3	444.4	170
6	A-3 & M-3	350.0	125	324.0	99	298.0	73	340.0	115	166.0	166	357.0	132	182.0	182
		874.6	432	879.8	194	884.8	403	881.3	203	882.2	545	884.0	214	884.1	554
7	A-0 & M-0	583.9	225	583.9	0	583.9	225	583.9	0	583.9	449	583.9	0	583.9	449
	A & M	290.7	207	295.9	194	300.9	178	297.4	203	298.3	96	300.1	214	300.2	105
8	A-4 sun	-0.7		-1.1		-1.4		-0.9		+0.7		-0.4		+0.3	
9	A-5 planet	-0.3		+1.1		+2.3		+0.3		+0.2		-0.6		+0.8	
	Age days	289.7		295.9		301.8		296.8		299.2		299.1		301.3	

10 Inferior conjunction (=day 292) + 4 = 296 mean Venus age for heliacal rising in the east.

FIG. 8

61 the net error is only 0.88. Hence cycle 61 of the 18 Uo table ended on 5 Kan 17 Mac by prediction, while the planet was 4 days ahead namely at 1 Ahau 13 Mac when heliacal rising in the east occurred.

Possibly the 1 Ahau 18 Uo ephemeris is mentioned only and not shown in full because it pertains to past time. The 1 Ahau 18 Kayab list of month positions occupies the central line because it formed the original basis. The 1 Ahau 13 Mac table followed the 18 Uo and occupies the upper position because pertaining to present time, current when this book was written. After serving through 61 cycles 5 Kan 7 Xul is the predicted date while the planet bases, is found not to exceed the 8 days allowable limits of variation through some 3 centuries before as well as 3 centuries after that 1 Ahau 18 Uo date. But what was this date in the long count?

The number 9. 9. 9.16. 0, 1 Ahau 18 Kayab was not necessarily the date of an heliacal rising in the east and datum for counting even Venus cycles. The number E2 =9.11. 7. 0 covered two consecutive intervals of 57 and 61 cycles respectively. The number D2 is the sum of 8 calendar rounds=1. 1. 1.14. 0 plus F2 or 4.12. 8. 0 namely 1. 5.14. 4. 0 and this when added to 9. 9. 9.16. 0, 1 Ahau 18 Kayab arrives at 10.15. 4. 2. 0, 1 Ahau 18 Uo, which may be the

datum from which the Venus cycles set forth above might be counted backward and forward in time.

The above hypothesis may now be tested for agreement or disagreement with the Goodman-Thompson correlation Ahau equation of 584285 days as set forth in the following scheme of calculations verified by the Willson table of Venus inferior conjunction dates as published by Dr. Spinden,[7] and the agreement is commensurate with the variations to which actual observations are subject (Fig. 8).

It is pertinent to quote Förstemann's commentary[8] for we also are "omitting for greater clearness—

1. The twenty hands pointing to the right with a knife placed over them, in the middle of the pages, which may mean nothing more than that these parts of the Venus year are to be read from left to right.

2. The Venus hieroglyph three lines below, repeated twenty times with the sign of the knife to denote *division* of the Venus revolution. [The one exception has been commented upon above.]

3. The Akbal sign [which]—means only that henceforth the *close* of the four periods of the Venus year is indicated below [just] as the *beginning* is indicated above.

4. The sixteen Venus signs also occurring below."

On page 185 he also states "The repetition of the cardinal points in the 15th and 20th lines—refer to the four periods, in the upper line to their beginning and in the lower to their close. Hence in the lower line the cardinal points must advance one place; and the gods belonging to them in the 16th and 19th lines must follow the same course." Accordingly diagonal lines in Figure 7 connect the points having the same name, east, north, west, south, proceeding counter clockwise. Presumably to the god of the east was allotted 236 days, to the god of the north was allotted 90 days, to the god of the west was allotted 250 days, and to the god of the south was allotted 8 days in the Venus cycle of 584 days total length.

The Maya Venus table as it stands would suffice for dating the limits of each of the four phases from the beginning of Baktun 10 in the ninth century A.D. down to Spanish conquest times in the 15th century within the allowable limit of error of 8 days. It must be remembered that only the 8-day phase could be observed to the nearest day. The limits of the other three phases could only be approximated and the uniform prediction table furnished all the data needed.

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ECUADOREAN FIGURINES AND THE CERAMIC MOLD IN THE NEW WORLD

In an issue of *El Palacio*,[1] Mr. Edwin N. Ferdon presents an interesting discussion of a group of pottery figurines[2] from the province of Esmeraldas on the coast of Ecuador. Most of these figurines were made entirely, or partially, with the use of the mold, and they are quite representative of the region. In attempting the assign approximate dates to the figurines Ferdon states (p. 225):

"Mould-made figurines made their appearance in the Valley of Mexico in Teotihuacan 3 times and in the Peten region of the Mayas in the Tepeu phase of Uaxactun Late 3 period, or about 900 A.D. Assuming that the mould-making technique spread southward from the Maya area, its arrival on the Ecuadorean coast must have been after 900 A.D. and possibly around 1000 or 1100 A.D. With the advent of the mould in Esmeraldas, new figurine types appeared, or else the earlier hand-modeled counterparts have not yet been found."[3]

Although the direction of the diffusion of the mold process is an assumption, and Ferdon does not press the point, the less conventional alternative for the origin and distribution of the mold in New World ceramic manufacture is not considered. To wit, what are the possibilities that the pottery mold was a South American invention which spread northward, arriving in Middle America on the Classic Teotihuacan-Maya Old Empire horizon?

In asking this question, and attempting to answer it, we are handicapped by the lack of secure cross-ties between Middle American and Andean sequences as well as by the absence of established culture sequences in Ecuador, Colombia, and much of intervening Central America. Hence, it is impossible to say with certainty just what cultural period of North Peru is equatable with Mayan Tepeu or Mexican Teotihuacan III. In my opinion, however, the best evidence at hand indicates that the Peruvian Chavín horizon is most reasonably paired, in configuration and content, with such relatively unspecialized Middle American levels as Honduran Playa de los Muertos, sub-Mayan Mamon and Chicanel, the early Tres Zapotes of Vera Cruz, and the Mexican "Archaic" or "Middle" cultures. This cultural similarity does not necessarily prove chronological contemporaneity, but such rough equations are the best that we can do at this time. Following such reasoning leads us, then, to equate the brilliant specialized and divergent regional culture growths for both Middle and South America on the same general time horizon. Peruvian north coast Mochica (Early Chimu) thus falls somewhere in the centuries prior to 1000 A.D., paralleling Tepeu and Teotihuacan III.

With these trial chronological correlations as a frame of reference, what are the occurrences of the pottery mold in Andean archaeological sequences? Larco Hoyle[4] states that molds were used in the manufacture of pottery vessels as early as the Cupisnique (Coast Chavín) culture of the north

[7] Herbert J. Spinden, "Maya Dates and What They Reveal." *Science Bulletin, The Museum of the Brooklyn Institute of Arts and Sciences*, Vol. 4, No. 1, Brooklyn, 1930, pp. 82–7.

[8] Ernst Förstemann, *ibid.*, p. 183.

[1] *El Palacio*, Vol. 52, No. 11, pp. 221–45, Santa Fe, 1945.

[2] From the collection of Mr. Max Konanz of Guayaquil.

[3] Butler gives a slightly earlier date for the appearance of mold-made figurines in the Old Empire. (Butler, Mary, "A Study of Maya Mould-made Figurines," *American Anthropologist*, N.S., Vol. 37, p. 641, Menasha, 1935.) They occur at Piedras Negras, where dated monuments range from 514 to 830 A.D. (Goodman-Thompson correlation.) It is, of course, possible that the figurines appeared only towards the end rather than the beginning of this time range.

[4] Rafael Larco Hoyle, "A Culture Sequence for the North Coast of Peru," in the "Handbook of South American Indians," Vol. 2, *Bulletin Bureau of American Ethnology*, No. 143, Washington, 1946, p. 158.

coast of Peru. Conventional estimated dating for Cupisnique ranges from 0 to 500 A.D. The use of the mold for making vessels in North Peru continued through the subsequent Salinar Period. In Mochica (500–700 to 1000 A.D.) it was a universal technique, and molds were used for figurines as well as vessels. The employment of the mold in ceramics spread to other parts of Peru in later periods; but the Peruvian north coast, together with the Ecuadorean coast, is indicated as its center of intensity and technological diversification for South America. Certainly, as far as the ceramic mold is concerned, coastal north Peru and coastal Ecuador form an historical unit. The direct implications from this are that the Ecuador-Peru coast had the mold in pottery manufacture considerably prior to the rise of the Classic Maya or Teotihuacan cultures, and that mold-made figurines were a commonplace in the Andean area before 1000 A.D.

Another line of approach that may have a bearing on the problem is the dating and distribution of metallurgical techniques in the Americas. True metallurgy, including casting, was apparently first developed somewhere in the area lying between Panama and north Peru, and it was an early development as there is evidence for metallurgy in Peru during pre-Mochica times. On the other hand cast metals do not appear in the Maya area until the close of the Old Empire. It is suggested that there is a technological relationship between the use of the mold in the casting of metals and the mold processes in pottery making. The marked South American priority and proficiency in the first craft lends weight to the thesis that the second also had South American rather than Middle American beginnings.

Obviously, the argument favoring a South American invention of the ceramic mold is not conclusive. For the present, though, I believe it has the edge on the case for a Middle American origin. Supporting the South American hypothesis we have the following: (1) apparent earlier Peruvian use of the mold in connection with pottery vessels and, probably, figurines; (2) strong and chronologically deep traditions of the plastic ceramic art and the mold in northern Peru; (3) early use of the mold in South American metallurgy, suggesting an early technological inter-connection between the ceramic and metal crafts.

In any event, the question is still an open one. The mold technique in figurines is not a firmly pegged datum whose chronological coefficient can be extended from the Maya area to Ecuador for the purpose of fine archaeological cross-dating. The origin of the mold, like many other New World inventions, such as horticulture, ceramics, and negative painting, is still a problem for Americanists.

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BOOK REVIEWS

Ash Hollow Cave, A Study of Stratigraphic Sequence in the Central Great Plains. JOHN L. CHAMPE. University of Nebraska Studies, N.S., No. 1. Lincoln, 1946.

The nucleus of this paper is a description of cultural succession at Ash Hollow Cave, a rock shelter located on a small tributary of the North Platte River in western Nebraska. Here a field party of the Nebraska State Historical Society under the supervision of Mr. A. T. Hill, Director of the Society, excavated the undisturbed portions of the floor deposits with gratifying results. All field data were made available to Dr. Champe by the excavators and the present report can be considered definitive.

The excavators were able to distinguish a total of seven superimposed culture-bearing lenses, scattered over a total depth of five to six feet, and either partially or completely separated by a matrix of light sand derived from the roof and walls of the cave. Even in areas where two or more of the charcoal-darkened lenses were in contact it was possible to plot the contact zone, owing to characteristic color differences. Little evidence of prehistoric disturbance was noted. Consequently cultural material could be assigned to the proper lens with slight chance of error after elimination of doubtful blocks. The general character and situation of the cave and the scanty content of the various lenses suggest a series of more or less temporary occupations by small groups, and the artifact assemblages of the stratigraphic units can be regarded as successive samples drawn out of the continuum of Plains culture over an extended period.

Analysis of artifacts and faunal remains produced nothing remarkable, except perhaps the almost complete absence of bison and antelope bones in the earlier layers and the presence of a number of sherds of various types not previously reported from the Plains area. Lens A (the uppermost) contained material readily attributable to the protohistoric Dismal River aspect. Lens B has been assigned to the Upper Republican aspect, but Lens C contained a mixed inventory indicating occupation by both Woodland and Upper Republican peoples, and on the evidence of two new ceramic types, probably some heretofore unknown groups as well. A Woodland culture, apparently quite similar to that of the Valley focus as described by Hill and Kivett, is characteristic of Lens D, there are hints of another Woodland occupation of different type, an element resembling the Upper Republican aspect is present, and again there are indications of a previously unknown ceramic complex, presumably western in origin. Pottery is absent from the lower three lenses (E, F, and G), and the total artifact list from these components is very small. The types present in the combined list suggest the Signal Butte II complex, but the scanty inventory from Ash Hollow Cave prevents any definite equation of the two horizons.

This notable stratigraphic record is augmented spectacularly by a tree ring sequence based on charcoal specimens from the cave, supplemented by non-archaeological sequences from Lincoln and Morrill Counties, Nebraska. The dendrochronology was the work of Harry E. Weakly, formerly of the University of Nebraska, and the original analysis was made without benefit of any information as to the stratigraphic situation. Lenses A to C present, with the aid of non-archaeological wood from the Morrill and Lincoln County sequences, an unbroken span from 1219 A.D. to the present. After due allowance for burned outer rings and assuming that observed terminal ring dates correspond quite closely to the year of utilization, suggested occupation dates for Lens A are 1675 to 1705, for the major occupation of Lens B from 1450 to 1517, and for Lens C a conservative minimum of 1300. Between Lenses C and D the record is broken, but the Lens D occupation terminated before 1210 A.D., the earliest ring in the Lens C sequence, and extended backward in time for about 150 years. By allowing 50 years for the sequence break, a suggested occupation dating of 1000 to 1150 A.D. is computed. Lenses E, F, and G contained three floating sequences of 246, 102, and 86 years. In the absence of overlap, it was necessary to assign dates by assuming a constant rate of deposit of ceiling and wall debris. This method gave an estimated date of 1 A.D. for the first occupation of the cave, with Lenses F and E placed at 300 to 400 and 600 to 850 A.D. respectively.

The latter half of the paper is devoted to compact summaries of other stratified sites in the Central Plains (Signal Butte and Sondergaard in Nebraska and Pottorf in Kansas), the White River terrace sites, several multi-component sites in eastern Nebraska, and a general consideration of time perspectives in the Central Plains. In addition three appendices are devoted to a report on dendrochronology by Mr. Weakly, notes on other multicomponent sites, and a systematic description of the pottery types found at Ash Hollow. The well known Walker Gilmore site is removed from the category "stratified," as the author was unable to discover clear evidence of actual superposition of the Sterns Creek and Nebraska Culture components. Other multi-component sites give indirect evidence of cultural succession through relationship to terraces, with Woodland appearing as the earlier member, but again direct superposition is absent. Consistent occurrence of Woodland manifestations buried in the latest valley fill and the whole problem of correlation of stream terraces and their included archaeological horizons are emphasized. In final synthesis, the stratified sites present nine successive units, grouped as Early Lithic (White River Yuma, Signal Butte I), Intermediate Lithic (Signal Butte 2, Ash Hollow G, F, and E), Early Ceramic (Woodland), Middle Ceramic (Upper Republican and Nebraska Culture on the same time level), and finally Late Ceramic (Dismal River). The previously estimated dates for Signal Butte and the Ash Hollow dates give a range from pre-6000 B.C. for the White River Yuma to 1700 A.D. for the beginning of the historic period.

The Ash Hollow sequence offers a salutary confirmation of the cultural succession commonly accepted in the Plains, and the tree ring dates inject an element of precision formerly absent in the area. Unfortunately, the record is deficient at several important points, although not from any lack of competence in excavation or interpretation. The

small inventories from the lower three lenses do not permit an adequate description of this virtually unknown period in Plains prehistory. Lack of dendrochronological overlap and a somewhat obscure stratigraphic situation in the Woodland-Upper Republican contact zone represented by Lenses C and D are particularly regrettable, especially since sherds are present which suggest transitional types. Little light is shed on the problem of the chronological relationship of the various manifestations lumped as "Woodland" in the Central Plains, nor do the mysterious ceramic cultures attributed to western groups gain much substance.

The report as a whole impresses the reviewer as a thorough and resourceful analysis of the available stratigraphic data. The interpretation of the Ash Hollow evidence is careful and will probably stand without major modification. A fuller description of the cultural content of the other stratified sites would have been welcome, but no serious criticism of concepts or treatment seems warranted.

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Angel Site, Vanderburgh County, Indiana. GLENN A. BLACK. Prehistoric Research Series, Indiana Historical Society, Vol. 2, No. 5, pp. 451–521. Indianapolis, 1944. 5 plates, 6 figures.

As one who has labored for some twenty months in the field and an equal length of time in the laboratory on the Kincaid site, an archaeological twin of this site in southern Indiana, I cannot help but read of the archaeological activities at the Angel site with considerable admiration and perhaps some envy.

This article is "designed primarily for the general reader" and for "the friends of Indiana archaeology who have followed the progress of this undertaking from a distance." Mr. Black has done an excellent preliminary job of portraying in not too technical jargon the techniques used, the materials found, and the interpretation of the archaeological features uncovered at this prehistoric metropolis near the Ohio river. His publication has the rare quality of being interesting and readable to the layman as well as acceptable to the professional archaeologists as a preliminary bulletin.

The report may be divided into three general parts: the historical and geographical setting of the site, the excavation at the site, and the material remains of the former inhabitants. The history of the explorations and the geographic or topographic background of the Angel site are adequately handled. The actual surveying and staking out of the whole archaeological manifestation, only briefly mentioned in the text, could well serve as a model for future excavations on large prehistoric villages. One criticism might be made of his speculations that are included with his description of one of the truncated mounds which has an offset conical mound. It would seem to me that his queries concerning the sequence and cultural identification of the builders of the two sections of this structure might have been answered if the conclusions concerning a similar mound excavated at Kincaid had been at least mentioned. The section on the excavations is an excellent summary of the kind of careful work an archaeologist should do, and the details concerning the prehistoric architecture and floor plans of the village are a definite contribution to the literature dealing with Middle Mississippi culture. Only an archaeologist who has dug in these Middle Mississippi village middens with their intrusive pits and posts as well as mazes of overlapping wall trenches can appreciate how carefully Black excavated to obtain his maps in Figures 4 and 5 and his conclusions set forth in the section entitled "House Patterns and Construction."

The final portion of the paper, on material culture, is lucidly written and certainly sufficient for "amateurs" and for a preliminary report to the professionals. However, I rather believe that the significance of the disc pipe of catlinite, often thought of as a time marker of proto-historic remains, should be brought out, as well as the art and objects indicative of the existence of the "Southern Cult."

In conclusion I am willing to predict on the basis of this preliminary report (as well as on my knowledge of Black's field techniques and capabilities) that the "full statistical description," the final report, will be a monumental work on prehistoric Middle Mississippi settlements.

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The Pleistocene Period. Its Climate, Chronology and Faunal Successions. FREDERICK E. ZEUNER. London: Ray Society, 1945. xii+322 pages, 76 figures.

Dating the Past, an Introduction to Geochronology. FREDERICK E. ZEUNER. London: Methuen and Co., Ltd., 1946. xviii+444 pages, 103 figures, 24 plates, 30 shillings.

Frederick E. Zeuner is Professor of Environmental Archaeology within the Department of Geochronology of the University of London Institute of Archaeology. The fact that such a chair exists is worthy of note. The lag in applying the powerful resources of ecology is one of the intellectual and political tragedies of our time. It may be that when we see what this discipline can do to elucidate the past of mankind, we shall be encouraged to make bolder use of it for the benefit of modern man.

To analyze and interpret any environment is a task which cuts ruthlessly across the conventional techniques of science. This is no less true as one works backward in time, not to mention the added burden of inference and cross-checking. The amount of sheer information which must be acquired and sifted is enormous. The validity and limitations of highly specialized methods must be judged, as to both the gathering and the treatment of data. For example, the choice of mathematical theory in dealing with recurring phenomena has a great deal to do with the kind of cycles that emerge, and whether any emerge.

Thus it is of the greatest importance that archaeologists have convenient access to the copious results of geochronological studies, and quite as important that they are informed as to methods and uncertainties. Zeuner's two books meet this need honestly and conscientiously, and deserve to be on the shelf of every American archaeologist.

The Pleistocene Period begins with a discussion of the principles of Pleistocene stratigraphy, including the prob-

lems of soils and terraces. This is followed by a treatment of the glaciated and periglacial regions of continental Europe. Then comes a study of Pleistocene chronology in the British Isles and a presentation of astronomical theory as a basis for absolute chronology. Following a correlation of European and North American glaciation, the astronomical theory is applied to climatic phases of the upper Pleistocene in the Mediterranean with its many classical sites, thereafter to southern Africa and the Antarctic. The two final chapters deal with sea-level fluctuations and faunal evolution. Faunal evolution is sensibly integrated with that of vegetation.

The emphasis on soils, terraces, and periglacial phenomena is important to American students. Along the great rivers which, from Texas through Nebraska, flow eastward across the prairie states is a series of terraces which *ought* to correlate with the several glaciations. And in the lowest of these are striking alternations of humus and mineral sediment which ought likewise to correlate with postglacial climatic fluctuations. In Oklahoma the reviewer has seen a number of deeply buried hearths with calcined seeds of *Celtis*, whose position ought to correlate with terrace erosion stages. Admittedly the techniques of analysis are laborious and difficult, but the rewards should be in proportion.

The astronomical theory referred to above is based on calculations of periodicity in the obliquity of the ecliptic, eccentricity of the orbit, and precession of the equinoxes, as these affect zonation and seasonal temperatures. Zeuner regards these phenomena as an adequate explanation of the alternations within the Pleistocene, but admits that they do not explain the Glacial Epoch itself. It takes rather close reading here to see that he has not abandoned his customary cautious and tentative attitude.

The second book, *Dating the Past*, is so full of information that it is virtually a reference book. The general plan is sound, proceeding backwards from the relative certainty of historical time. The first section deals with history and pre-history, emphasizing first the tree-ring method of Douglass and others. Thereafter comes an account of postglacial investigations, particularly varve chronology and pollen analysis.

Next comes a discussion of the Pleistocene, conveniently summarizing the volume reviewed above. Finally the author tackles the tremendous problem of time before Man (to whom he assigns a Pliocene origin). In connection with this last and most difficult problem, evidence is marshalled from astronomy, geophysics, and evolution. This furnishes wholesome (and rather reassuring) reading for those of us who are in the habit of glibly quoting ready-made figures. The discussion of radioactivity is concrete and helpful.

In the discussion of Early Man every effort is made to correlate dates with both cultural and physical types. Such an analysis introduces great difficulties but is essential. It involves, among other things, the problem of the origin of *Homo sapiens* and the author apparently inclines to the view that this event goes back to early Pleistocene. For cultures there are the classical sequences of Western Europe, also the assumption that hand-axe and hollow scraper suggest plant-users, while cutting and piercing flakes indicate hunters. To the degree that these distinctions are clear-cut and general, they should be helpful in separating interglacial and periglacial cultures. But as Braidwood (*Journal of Near Eastern Studies* 6, Vol. 1, pp. 30–42, 1947) points out, the sequences do not hold for Asia and Africa and the crafts may have intermingled in Europe much more than has been supposed. Zeuner is careful to show that his judgments in these matters are provisional.

The illustrations are excellent and numerous, tables generously supplied and explicit. The very full presentation of the classical Baltic region with its geological sequence, varves, pollen profiles, and cultural records would alone make the book valuable. Much of this material has been so scattered that, even for the specialist, a unified picture has been difficult.

Students of the evolution of man will find the chronology of speciation stimulating, whether they accept it or not. Zeuner is inclined to assign a minimum period of 500,000 years for the evolution of a species. He also presents a doctrine of explosive evolution—"when a major group appears . . . its main subdivisions also appear within a comparatively short space of time. This episode is followed by a longer stretch of time when evolution proceeds at a quieter pace." Significantly he points out the parallel between the curve of group evolution and that of multiplication in a bacterial colony. Does the rate of origin have as much to do with the record as the rate of population increase? The two phenomena are not necessarily parallel. The first is a matter of genetics, the second of ecology.

No one could hope to deal with such a variety of evidence without encountering criticism from specialists. The clearness, organization, and candor with which Zeuner has developed his material will make criticism and revision an easy task. And that is a very great service to science.

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A Stratified Prehistoric Site at Brewerton, New York. WILLIAM A. RITCHIE. Researches and Transactions of the New York State Archeological Association, vol. 11, no. 1. Rochester, N. Y., 1946.

Dr. Ritchie's latest contribution to our growing picture of the archaeology of central New York is a much more significant report than its title and small size would indicate. It not only supplies vital data on two of the most interesting and less adequately known periods in the archaeological sequence of the Brewerton area, but also includes a general discussion of the problems of Point Peninsula relationships to the Archaic and to Owasco, in which Ritchie is now able to carry his interpretation far beyond the stage which knowledge of Point Peninsula permitted at the time of his earlier syntheses.

The Wickham site, on which this report is based, represents an Owasco occupation overlying a Point Peninsula midden. The site is stratified, at least in part, and extensive pitting by peoples of both occupations resulted in a complex structural pattern which is only outlined in this report. It is barely possible that a thin mantle of pre-Vine Valley debris was disturbed by the Point Peninsula occupation. It is uncertain to what extent wash from the adjacent slope

has contributed to the midden accumulation and whether any of the included artifacts may have been redeposited with this wash. As a result there is some uncertainty as to whether these two complexes are the only ones represented. The analysis of the material and the separation of the two components depends very strongly on Ritchie's earlier excavations on sites of both cultures and his data on collections from other sites. Available data on the physical stratigraphy would indicate that a discontinuity is present between the two cultures, although this was not recognized during the first season's excavation.

Whether, as Ritchie believes, the site represents two culture complexes, or whether, as seems possible, there are more than two present, or even a sequence including both Point Peninsula and Canandaigua, the described Point Peninsula series from this site represents the most varied Point Peninsula trait list so far recorded for New York. Several traits previously considered diagnostic of the Laurentian Aspect, such as curved flint knives, are here associated with characteristic Point Peninsula materials. Several artifact types, including a trianguloid copper projectile point and a pottery series, not previously described are also apparently part of the same complex. Both the Vinette 1 pottery type and the Vinette 2 series are present, as well as variant styles of a Wickham Punctate series, which may overlap with the Vinette types. Thus the whole known pre-Owasco ceramic sequence is here present, and with more variation than on other sites of the same complex. The Vinette 1 type is the earliest pottery in the Northeast, and is associated with steatite tempered stone-vessel-shaped pottery in New Jersey, eastern Pennsylvania, and Maryland, where it forms a part of the earliest ceramic complex. The Vinette 2 types are variants on the widespread Woodland tradition which is best typified by the pottery of Hopewell sites other than those in New York. A part of the Wickham series would seem to be design variants of the Vinette 2 series. Ritchie outlines the associations and chronological implications of these various pottery types in New York in a very suggestive section which outlines the major problems. In fact the report is so concentrate that implications of primary importance to every student of northeastern archeology are packed throughout, and there is much that could be profitably enlarged upon. The condensation is, of course, necessitated by the small publication fund available, but this report, we hope, might be considered a preliminary study which should be enlarged when possible, with adequate pottery descriptions and discussions of artifact typology and with a description of non-artifact features discovered at the site. The Wickham site is also significant enough to merit much more extensive excavation than it has received, but the sample as here reported contributes substantially to our knowledge of the middle period in New York archaeology. New data on other sites of various Owasco and Point Peninsula foci are included in passing in several sections of the report.

Of as much significance as the data reported in this study are the general conclusions drawn by Ritchie. Recognition of a developmental sequence in New York archaeology is here suggested for the first time in his excellent series of reports, and the evidence for and against such a theory of local development outlined. Conjectures on the directions of the various influences which have modified this sequential development and their diverse origins are not, in my opinion, as well founded, but again pose significant and specific problems for those working in adjacent areas. Especially noteworthy is Ritchi's suggestion of partial or even total derivation of Owasco from Point Peninsula. This brief report is especially significant because it succinctly outlines Ritchie's latest conclusions concerning the broad trends in the archaeology of his area, and shows primary interest in aspects other than classification. I hope that later excavation and reports on the Wickham and other sites will be less limited by funds and that it may be possible to present more of the evidence for the many suggestions and hypotheses presented in the last of the Brewerton papers.

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NOTES AND NEWS

PACIFIC COAST AREA

The Department of Anthropology of the University of California (Berkeley) has conducted several survey explorations since September, 1946, which resulted in the location of a number of sites. Excavation of a burial site near Concord, about 20 miles east of Berkeley in the Ignacio Valley, was carried out in September and October, and resulted in the finding of nine burials and incidental artifacts in the culture stratum. The thin occupation layer is buried under 48 inches of water-deposited alluvium which exhibits two well-developed soil profiles indicating two post-occupation periods of deposition. The soil development profiles were studied by the Division of Soils, and a report by Drs. Earle Storie and Frank Harradine indicates that the profile is of the Tierra series and falls into the classification of "mature." An age estimate on the basis of these pedologic investigations yields a minimum date of 4000 and a maximum of 8000 years. Since the cultural material closely resembles that from the lower levels of the oldest San Francisco Bay shell mounds, and because three independent workers have made age calculations for the latter which yield dates of from 3 to 4 millennia, the minimum age estimate of the Concord site seems reasonable.

The Department of Anthropology at Berkeley on two occasions conducted archaeological investigations of historic sites at the request of the State Park Commission and the National Park Service. The first work was done at Monterey under the direction of Dr. Richard K. Beardsley and resulted in the finding of the base of the flag pole on which was raised the first American flag in California on July 7, 1846. His report is published in the *California Historical Society Quarterly*, Vol. 25, No. 3, 1946. The second exploration was that of the excavation of the sawmill erected by Captain J. A. Sutter on the South Fork of the American River at Coloma. The site is historically significant since it marks the location of the discovery of gold by James W. Marshall on January 24, 1848. The excavation yielded the foundation timbers of the mill, whose dimensions were 20 by 60 feet, and the plank-sided tailrace, which was followed for a distance of nearly 200 feet, as well as numerous artifacts of the 1847–1850 period (glass bottles, tools, nails, bolts, clay pipes) which commonly occur in historic Indian sites.

The University of California is planning to put three field parties out in the coming summer: one will excavate an Early Central California horizon site near Thornton, buried under four feet of alluvium; another will conduct exploration of an historic Nisenan village site near Sacramento; and the third, in cooperation with the University of California at Los Angeles, will excavate a large site in Topanga Canyon, Los Angeles County, which is apparently related to the San Dieguito-Lake Mohave culture horizon of Southern California.

Dr. Sherburne F. Cook, Division of Physiology, and Dr. Hans Jenny, Division of Soils, of the University of California are conducting an investigation of considerable interest to ethnologists and archaeologists. Central California occupation sites fall into three main groups on the basis of time. A large number of these sites have been sampled with strata pits, and the samples are now being subjected to chemical analysis. Dr. Jenny's interest in this project lies in the opportunity to study the evolution of soils. Certain phenomena of a pedologic nature have been observed in Indian mounds, particularly in the oldest group (Early Central California horizon) which resemble processes known to occur in natural soils. These alterations are to be the object of laboratory study in the hope that such changes in a more or less dated series of site deposits will yield some idea of the time involved for such changes to develop. Dr. Cook's interest lies in the "human angle." It is assumed that in a habitation site that all materials have been deposited through human activity. The problem is to determine to what extent these physical and chemical residues will yield information regarding the inhabitants of a site. At the chemical level it is clear that such substances as lime, carbonates, carbon, and nitrogen are directly related to the presence of earlier inhabitants through food residues, excreta, imported plant materials, and the like. It is possible also that these quantitative and qualitative chemical data may be of significance in arriving at age estimates of sites. For instance, preliminary results indicate that the relocation of carbonates to form a lime hardpan is not demonstrable in Late horizon sites; is perceptible and reasonably definite in Middle horizon sites; and has run substantially to conclusion in some of the Early horizon sites. These phenomena are to be understood in terms of sufficient elapsed time to permit lime alteration of site strata. On the mechanical, or physical level, certain items are preserved for long periods in relatively intact condition (shell, bone, stone, burned clay). By adequate sampling methods it is possible to calculate within reasonable limits the total content of a mound with respect to these materials. Observation of variable percentages of, for example, bone or obsidian chips, in sites of different geographical position or time horizon will probably yield valuable cultural data on food habits, availability of specific raw materials, etc. Providing adequate sampling techniques can be devised, and a sufficient number of sites are tested, this method of "chemical archaeology" may prove to be a new and extremely useful archaeological technique.

Malcolm Farmer, Acting Director and Curator of Anthropology at the San Diego Museum of Man, reports that the Museum buildings have not yet been reopened due to wartime use of the facilities by the Navy. Malcolm J. Rogers resigned from the museum staff a year ago, and Mr. H. Thomas Cain joined the staff recently as Curator of Archaeology. Cain comes from the University of Arizona.

Dr. Joseph Weckler of the Department of Anthropology, University of Southern California, has been conducting archaeological survey trips into the Twenty-Nine Palms region, and is planning to extend investigations into the Piru Creek area of Ventura County where several cave sites are reported.

Arthur Woodward, Los Angeles Museum, is planning to

issue a report on last summer's field trip in Southern Colorado where petroglyphs and pictographs were noted. The report will place emphasis on style changes in rock writings attributable to the last century. The Los Angeles Museum hopes to renew its activities on the Channel Islands in the near future. The Islands were restricted by the Navy during the War, and this interval was used by Woodward to complete the search for historic material bearing on the islands.

Aubrey Neashan, Regional Historian, National Park Service, reports that preliminary archaeological surveys are now under way in the Columbia River Basin. The work is being carried out with funds transferred to the National Park Service and Smithsonian Institution from the Bureau of Reclamation. Similar surveys are planned in other Pacific Coast water control areas as soon as funds are available. Thomas A. Garth, Custodian of Whitman National Monument at Walla Walla, is now engaged in an archaeological investigation of the mission established by Marcus Whitman in 1836. The archaeological interest plus documentary materials now on hand will furnish the basis for a projected museum.

At the University of Washington, Seattle, archaeology courses and field work are now in the hands of Mr. Arden King. Dr. William Wallace has joined the faculty of the Department of Anthropology, University of Indiana. Mr. Franklin Fenenga is now beginning archaeological survey of dam areas in Central California under direction of the Smithsonian Institution.

Dr. Richard K. Beardsley has left Berkeley for the University of Minnesota, and will join the faculty of the University of Michigan, Ann Arbor, in September. Robert F. Heizer has joined the faculty of the University of California, Berkeley. Dr. George Brainerd has joined the faculty of the University of California, Los Angeles, and holds also a position with the Southwest Museum. (*R. F. H.*)

THE SOUTHWESTERN ANTHROPOLOGICAL ASSOCIATION

The Southwestern Anthropological Association was organized in 1928 as the Southwestern Archaeological Federation. Its membership for many years was made up principally of museum personnel and of non-professionals interested in archaeology. One of the purposes for which it was created was to discourage pot-hunting and to give interested amateurs an opportunity to meet with professional workers. In recent years the growth of anthropology departments in the colleges and universities of southern California has brought to the area a group of ethnologists, social anthropologists, and students of linguistics. In order to provide a meeting place for these workers, the organization at a meeting in November, 1946, reorganized and broadened its scope, as indicated by the new name. However, it is still one of the prime purposes of the organization to give non-professionals a chance to maintain acquaintance with anthropologists and to share in discussion of the progress and results of their work.

Membership usually stands at about 75 or 100. Four meetings are held each year, and when possible the spring meeting consists of a field trip. The regular meetings, which consist of programs of progress reports and talks, are held at various museums and campuses in southern California. There is an "institutional membership" for academic institutions, but the Association is not a federation of other organizations. The Association does not issue a publication, but has tentative plans for a small bulletin to report items of professional interest.

The present officers are: President, Dr. Harry Hoijer, University of California, Los Angeles; Vice-President, Mr. Robert M. Ariss, Los Angeles County Museum; and Secretary-Treasurer, Mr. Edwin H. Carpenter, Jr., 5261 Coliseum St., Los Angeles 16, California. Dues are $1.00 annually, application for membership being acted upon by the Executive Committee, which consists of the above-named officers and Miss Barbara Loomis of the Los Angeles County Museum and Mr. Philip C. Orr of the Santa Barbara Museum of Natural History. (*E. H. C.*)

THE SOUTHWEST

Dr. and Mrs. H. S. Colton of the Museum of Northern Arizona have spent the winter in Santa Barbara where Dr. Colton worked on three books: *Hopi Kachina Dolls*, *Techniques of Southwestern Ceramics*, and a popular account of the archaeology of the Flagstaff region to follow *The Sinagua*. Miss Katharine Bartlett was also in Santa Barbara and is preparing data on the physical anthropology of the prehistoric folk of Flagstaff and the Verde Valley. The Museum plans no excavation during the coming summer, although Dr. Colton may give a course in Southwestern ceramics to a few selected students during July.

Under the direction of F. H. Douglas, the Department of Indian Art of the Denver Art Museum is beginning a lengthy project which involves a complete re-examination of its collections with the idea of reducing the size of the collections and thereby increasing their quality and making them more workable. It is expected that several thousand items will be withdrawn from the collection and made available for sale or exchange to other institutions needing to fill out their collections. Some months from now it is planned to circulate lists of available material. Publication of the newsletter of the Clearing House for Southwestern Museums has been resumed.

During the past winter the staff of Gila Pueblo has been engaged in confirming and extending tree-ring dating and chronologies. Beginning in May, Gila Pueblo will conduct investigations, including excavation, in western New Mexico, primarily for the purpose of obtaining beam material to further strengthen the correlations between tree-ring dating and archaeology. Later in the summer, work will be begun on early Pueblo remains in the Four Corners area for the same purposes. Dr. Deric O'Bryan, of Gila Pueblo, plans to excavate in Mesa Verde National Park during the coming summer.

At the Colorado Museum of Natural History, Marie Wormington has finished writing a general summary of Southwestern archaeology, designed for the layman, which will appear in the Museum's Popular Series. Summer plans include the completion of excavation at the Turner Site, a peripheral site near Cisco, Utah. The Museum excavated there for three seasons before the war.

The University of Arizona will open its Archaeological Field School at Point of Pines, San Carlos Indian Reservation, on June 15 and continue in session until August 15. This project is jointly sponsored by the Department of Anthropology and the Arizona State Museum. A ten- to fifteen-year study program is projected. A permanent camp is being established on land leased from the Apache tribe and the eventual student capacity of the establishment will be twenty-five.

During the 1947 season the excavations will be restricted to the late Pueblo ruins ranging in time from 1100 to 1400 A.D. The School will be directed by Dr. Emil Haury, of the University of Arizona.

Dr. Edward H. Spicer, of the Department of Anthropology of the University of Arizona, will continue studies among the Yaqui which were interrupted by the war under a Guggenheim Fellowship. He will be in the field from June through August and expects to complete the community study of Potam, Sonora, started in 1941–42.

By arrangement with Dr. Haury, who had tentatively scheduled a Point of Pines Conference for August, the University of New Mexico will hold a Chaco Conference in 1947 and the University of Arizona will schedule a Point of Pines Conference for 1948.

The University of New Mexico will hold a Chaco field session and, later in the summer, will send a group of advanced students into southeastern Chihuahua, for reconnaissance and excavation under the direction of Dr. Paul Reiter. The Chaco plans include a survey of the archaeological sites within the National Monument. By agreement with Dr. Haury, The Sixth Annual Chaco Conference of Southwestern Anthropologists will be held at Chaco Canyon on July 28, 29, and 30.

Dr. Donald D. Brand, head of the department of Anthropology at the University of New Mexico, has announced his resignation and will join the Department of Geography faculty at the University of Michigan.

The activities of the staff of the Taylor Museum at Colorado Springs have been largely concerned with current exhibitions and cataloging. An exhibition of Western Mexican ceramics is planned for next summer. W. S. Stallings, Jr., the Director, has gone to Mexico to arrange for the exhibit and to survey the tree-ring situation in Durango. He has been working on a study of the relation of heartwood to age in ponderosa pine and Douglas fir in order to find a means of estimating the number of rings lost from the outside of logs. Stallings and Stanley Stubbs, of the Laboratory of Anthropology in Santa Fe, are preparing for publication the long-delayed report on Pueblo Pindi, a Pueblo III site near Santa Fe which was excavated some years ago.

At the Museum of New Mexico in Santa Fe, Bertha Dutton is working on her doctoral dissertation dealing with "Toltec" influence on Chichen Itza culture. Ed Ferdon's report "An Excavation of Hermit's Cave, New Mexico" came from the press last month and his ethnic map of Ecuador is completed. Ferdon now plans a study of Ecuadorian potsherds. Marjorie Tichy is working on her Paako report and Al Ely has begun an aerial reconnaissance of the region of the "Saline Pueblos." The duties of the late Dr. Edgar L. Hewett, director of the Museum, have been taken over by Mr. Paul A. F. Walter, editor of *El Palacio*, who is now Acting Director. A memorial service for Dr. Hewett is planned in August.

Research projects of National Park Service personnel are as follows. Dale S. King has virtually completed his report on Nalakihu and Charlie R. Steen's report on the Tonto cliff dwellings is nearly done. Dr. Erik Reed's report on Mancos Canyon, Colorado, has been revised and is ready for eventual publication. The manuscript by Earl Jackson and Sallie P. Brewer on CWA excavations at Montezuma Castle National Monument in 1934, and a study of Montezuma Castle textiles by Kate Peck Kent, are being given final editing by Mr. King prior to publication by the Southwestern Monuments Association. Dr. Reed has just made a hasty study of 300 potsherd collections from the 1941–42 archaeological survey of the Petrified Forest National Monument, and plans to go over survey collections at Grand Canyon National Park this spring. Funds are anticipated for the urgently required salvage excavation to be directed by Dr. G. C. Baldwin in the portion of the Boulder Dam Recreational Area to be flooded by the waters of Davis Dam, now under construction.

An extensive stabilization program has begun at Chaco Canyon National Monument, under the direction of Gordon Vivian and J. A. Lancaster of the National Park Service. Repair work is currently under way at Chetro Ketl.

Charles E. Dibble, of the Department of Anthropology of the University of Utah, is studying a number of Aztec codices and plans publication of his study this year. He anticipates future research on the same problems in Mexico City. During 1946, Dibble and several anthropology students spent four weeks excavating a kiva in the San Juan area. The finds included a series of paintings around the kiva wall. Also during 1946, Samuel Tobin, of the same department, undertook research in the Mesa Verde region in association with Ansel F. Hall's Explorer's Club. The site investigated is known as the Cahone Ruin, and is located approximately six miles west of Cahone, Colorado, and four miles northwest of Lowry Ruin. The site shows a continuous habitation over several Pueblo periods.

Walter D. Enger, Jr. and William C. Blair, anthropology students at the University of Utah, are studying crania from the Warren Mounds, located eight miles west of Ogden. Enger is also conducting a study of the artifacts from this site for use as a Master's thesis. The Department of Anthropology plans extensive archaeological surveys of the area south and east of the Colorado River in the region of Dewey and Cisco, and in eastern Utah near Vernal. (*P. W. R.*)

NORTHERN MISSISSIPPI VALLEY

After twenty-three years with the University of Chicago, Dr. Fay-Cooper Cole is retiring to devote his time to archaeological research and writing. He expects to spend a considerable part of his time during the next two years in preparing local archaeological materials for publication. He writes that he plans to publish the report on the Kincaid site sometime this year.

Kenneth Orr, who has recently joined the staff, will be directly responsible for North American Archaeology and

for field work in the Illinois area. Old World Prehistory will be continued by Robert Braidwood, while regional courses will be given by Robert Redfield, Paul Martin, Donald Collier, and George Quimby. The latter three will also handle the three-quarter course in Museology, which has a heavy orientation toward archaeology. Two doctoral and three master's theses are now being written on archaeological topics of local interest. Joint field excavations will be carried on in cooperation with the Illinois State Museum, with John McGregor and Kenneth Orr in charge of operations.

Thorne Deuel, of the Illinois State Museum, writes that reports upon two Hopewell sites in Illinois are being prepared for publication, as is an annotated bibliography on Illinois archaeology. Summer field work plans call for cooperation with the University of Chicago in the exploration of a historic Indian site thought to be Kaskaskia.

At the present time, John McGregor, assisted by members of the Illinois State Archaeological Society, is making a survey of all known Indian sites in Illinois. Locations of all sites recorded in the literature or reported by local informants are being plotted on county maps, and all available information on each site is being systematically filed.

Dioramas interpreting the life of the Hopewellian peoples in Illinois are in preparation for museum display. These exhibits, showing physical types, costumes and economic life, are being developed by Deuel, McGregor, and Bartlett Frost. W. M. Krogman is participating in this project by giving technical information relating to the restoration of individual physical appearance from actual skeletal remains.

The Indiana Historical Society is continuing its program of explorations at the Angel site near Newburgh, Indiana, with Glenn A. Black directing activities. Present plans call for increased research work during the coming season. In cooperation with Indiana University, advanced students, enrolled in Field Work in Anthropology (Course 209), will participate in the excavations at the Angel site and will be instructed in field and laboratory techniques.

Surveys of areas in Indiana likely to be flooded by the construction of proposed dams are being made by William R. Adams under the direction of Glenn Black. Mr. Adams, who is employed by the Indiana Historical Bureau, has already reported upon one county and is now preparing a manuscript upon another area.

Two courses of Indiana University now being offered by Glenn Black are listed as follows: Archaeology of North America and Archaeology of the Ohio Valley.

Dr. Charles R. Keyes, of the State Historical Society of Iowa, writes that "Through a period of some ten weeks during 1945 and 1946, with the help of Summer School students in Cornell College, the Iowa Survey excavated two rock shelters on the Palisades-Kepler State Park area, six miles from Mt. Vernon, and processed 40,000 items sieved from these."

Dr. E. F. Greenman of the Museum of Anthropology, University of Michigan, reports that "The forthcoming field season will be spent, as usual, in Ontario on the three sites near Killarney. The work is being done by students, and there is a course of instruction in field techniques, human osteology, glacial geology, and the taxonomic picture for the Great Lakes region. In the summer of 1938 an early historic cemetery 25 miles from Killarney was excavated, and the report on that work will be out within the next few months. Killarney is on the old canoe-route from Mackinac to Montreal, and is only forty miles from the mouth of French River. There will be an attempt this summer to locate other early historic sites in that locality, of which information has already been received.

In last summer's work on the site GL1, the highest and oldest of the three beach sites at Killarney, two new types of projectile points were found, one of the Eden Yuma type with an expanding stem, very slight shoulders and slightly indented base, and one point with shallow side notches. GL1 may yet turn out to have two components.

The season at Killarney begins on June 28th and goes until September 2.

James B. Griffin announces that "The Museum of Anthropology of the University of Michigan will have a small field party in the area around the mouths of the Missouri and Illinois during the first part of April in an effort to obtain ceramic stratigraphy from some of the Hopewell village sites."

Present plans for the growth of the Department and the Museum of Anthropology of the University of Michigan will enable the University to grant Ph.D. degrees in Anthropology, particularly in the fields of American Archaeology and Cultural Anthropology.

John Bennett of Ohio State University reports that two new courses are planned in archaeology. One of these, American Archaeology, will be given in the Fall Quarter by Bennett and members of the Ohio State Museum staff. The second course, to be given twice yearly, will deal with human evolution and prehistory. Tentative plans also call for cooperation with the Ohio State Museum in archaeological field work.

Field work, which was discontinued during the war, was resumed in 1946, with the attention of the Department of Archaeology of the Ohio State Museum directed toward the making of surveys of areas to be flooded by dam construction. In the month of July, Raymond S. Baby completed the survey of the Delaware Reservoir Area and made a partial survey of the Dillon Area. Surveys are also planned for other proposed reservoir areas under both Federal and State jurisdiction, and excavation of certain sites likely to be destroyed or damaged is contemplated.

A small exhibit was installed in the Museum Room at Fort Hill State Memorial interpreting the natural and archaeological features of the park. In addition, a guide booklet is now in preparation for that area, which contains one of the best preserved hill-top enclosures in Ohio.

A *Bibliography of Ohio Archaeology*, prepared by James H. Rodabaugh and Richard G. Morgan, has been completed and will be published sometime this year.

Mound City, one of the outstanding sites of the Hopewell culture and formerly administered by the Ohio State Archaeological and Historical Society, has been taken over by the National Park Service and is now known as the Mound City Group National Monument.

Raymond S. Baby, Department of Anatomy, Western

Reserve University, reports that he and William H. Sassaman have their report on the Doubler village site (Cuyahoga County, Ohio) essentially completed. Part I of the report deals with the excavation of the site which was made in 1942, while Part II, by Baby, is a study of crania from five northern Ohio sites of the Iroquois aspect.

Loren C. Eisely, head of the Department of Sociology and Anthropology of Oberlin College, will take up his new duties in July as head of the Department of Anthropology of the University of Pennsylvania.

During the summer of 1946 the Cincinnati Museum of Natural History carried on excavations at the Turpin site in Hamilton County, Ohio. This site, which was partly excavated by Charles Metz for the Peabody Museum in the 1880's, is a component of the Madisonville focus of the Fort Ancient aspect. The recent exploration uncovered additional human skeletal material, artifacts and pottery characteristic of the focus. The work was done under the supervision of Ralph Dury, director of the Museum and Charles M. Oehler, Museum archaeologist. (*R. G. M.*)

NORTHEASTERN AREA

Frederick Johnson of the Robert S. Peabody Foundation for Archaeology, Andover, Massachusetts, reports that "In April, 1946 new excavations in Boston promised to bring to light sections of the Boylston Street fishweir. A second study of the sediments surrounding the structure was inaugurated at this time. In June, a core 109 feet long, extending from the surface of the excavation to bed rock, was removed. In January, stakes from the fishweir were uncovered. The study is designed to amplify and correct the former study. The core is of particular value and interest for it will supply information which has been lacking. It is expected that the sequence of deposits will become known through the analysis of this core and that it will be possible to place the fishweir in this sequence more accurately than was done previously. L. R. Wilson of Massachusetts State College is studying the pollen; Sheldon Judson of Harvard is pursuing extensive geological investigations under the direction of Kirk Bryan; Paul Conger of the Smithsonian Institution is identifying the diatoms; Elso Barghoorn of Harvard is analyzing the contents of a layer of peat. Fred Phleger of Amherst College is identifying the foraminifera. My duties are nebulous at the moment for I act as a 'coordinator' for the whole project. Presumably the final summary and collation of all the data will devolve upon me. The process of collection of data is now ended and laboratory work has begun. It is hoped that the study will be published in about two years.

"I am laying plans to excavate the first clearly stratified site which has been found in eastern Massachusetts. The site was discovered by the W. K. Moorehead Chapter of the Massachusetts Archaeological Society. After several months work they turned the site over to the Peabody Foundation. Researches in the documents prove fairly satisfactorily that the site is the ancient Tithicut, mentioned in the early history of Massachusetts. Beneath the floor of a large house dated at the European contact, there is a sterile layer of varying thickness and this covers a level of occupation. The latter appears to be a non-pottery horizon; its cultural affinities are at the moment unknown although the general run of material is common to the area."

Further news from Massachusetts, contributed by Ripley P. Bullen, also of the R. S. Peabody Foundation for Archaeology, includes the following items:

"Elmer Harp, recently a graduate student at Harvard University, has moved to Hanover, New Hampshire, to take over his duties as Curator of Anthropology of the museum at Dartmouth College. He is planning to do some excavating near Hanover at a later date.

"Wendell S. Hadlock of the Abbe Museum, Bar Harbor, Maine, and Douglas S. Byers of the Robert S. Peabody Foundation for Archaeology, Andover, Massachusetts, are both planning excavations in Maine this summer.

"During 1946, Ripley P. Bullen excavated a small shell heap at Ipswich. A partial study of the material found indicates definite prehistoric connections with Maine. Part of the shell heap contained items of European origin, thus aiding in the definition of the proto-historic Indian pottery.

"The Nipmuc Chapter of the Massachusetts Archaeological Society is planning to complete its work at Bummet Brook, a site near Worcester, and to excavate another nearby site.

"Henry Hornblower is planning the completion of excavations at the Winslow site in Marshfield, Massachusetts. This colonial site was occupied from 1635 to 1700 and has produced early European pottery such as might be found at historic Indian sites."

A promising excavation begun in Rhode Island is described by Herbert A. Luther, as follows:

"The Narragansett Archaeological Society of Rhode Island reports that it has focused its attention during the past season on excavating a shell heap site on the southern shores of Rhode Island. The site is located on a salt bay inlet called Potter's Pond, and is of fair dimensions for this region. The shell heap extends along the shore approximately 60 meters, and extends inland approximately 25 meters. Excavations were begun in May, 1946, and it was found that the shell heap consisted predominantly of oyster shell, with some scallop, clam, sea clam, and quohaug shells. Hearths and ashpits have occurred in fair abundance over the whole area excavated. Artifacts found include arrowpoints, knives, scrapers, soapstone pottery, and clay pottery fragments, bone awls, antler tools, and a few larger specimens. Among the most notable in the latter class was a very well polished grooveless ax. A highly polished rim fragment of a stone platform pipe was also recovered. There have been no indications of any European contact at the site thus far.

"Only one burial has been encountered in the shell deposit, a multiple burial of a child and an adult woman, but this was of particular interest in that the grave was lined and covered with rough field stones. The only mortuary accompaniment was a piece of disintegrated iron pyrites, which had been placed directly over the knees of the adult. One interesting feature thus far is the fact that steatite pottery of a heavy type is found principally in the humus level below the shell layer. Very little, if any, of this occurred in the shell layer, where the utensils were almost

without exception clay pottery, and although the excavation has not proceeded too far as yet, it appears that this characteristic is quite uniform.

"The group expects to continue excavations in the shell heap during the current season, with increased interest. However, it is expected that several seasons will be required to complete the task."

Excavations conducted last September in central New York by the Rochester Museum of Arts and Sciences, under the direction of Dr. William A. Ritchie, uncovered a unique pottery deposit of the early Owasco culture in the bank of a small stream. It is estimated that more than 200 entire vessels, some of them containing animal food (bones of the bear predominated), had been broken here, evidently with ceremonial intention. A modeled clay phallus, unlike anything ever reported; a pottery elbow type pipe; and a few hammerstones were the only accompanying objects. A report on the discovery and its possible significance is now being prepared by Dr. Ritchie.

A Rochester Museum expedition, led by Dr. Ritchie, will, during the coming summer, attempt to find in southeastern New York, data relative to the prehistoric culture of the Delaware Indians.

Two chapters of the New York State Archaeological Association, viz., Lewis Henry Morgan Chapter of Rochester, and Van Epps-Hartley Chapter of Schenectady, have revived their programs of meetings and research, interrupted by the war, aided by an increasingly popular interest in archaeology. (*W. A. R.*)

SOUTH AMERICA

In southern Peru, Dr. John H. Rowe was sent by Peabody Museum, Harvard, for three months in the summer of 1946 to collect field notes and work up collections made for the University of Cuzco during 1942–43 and abandoned because of the war. The collections included the sherds from a test excavation in an Early Inca site inside of Sacsahuaman, a collection from a looted cemetery of beehive tombs at Yucay, and extensive surface collections from the Departments of Cuzco and Puno; the notes also include studies of Late Inca adobe architecture. In addition to working up this material and doing some further survey work at Jauja and Cuzco, Rowe was able to study surface collections made by two former students at the University of Cuzco, Gustavo Alencastre and Cesar Zanabria. Their collections represented the Checacupe and Andahuaylas regions respectively.

The report on this work of Rowe's will be published in the *Papers of the Peabody Museum*, and as now planned will take the form of a survey of present knowledge of the archaeological problems of the highland zone between Puno and Oroya. It will report new pottery styles on the incised horizon from Ayaviri and Andahuaylas, evidence for the distribution of the Coast Tiahuanaco and Killke styles in the area studied, a new pottery style which represents the development of Cuzco Polychrome in the early Colonial Period, and evidence that the Inca style in general lasted much later into the Colonial Period than has been supposed. It will also include the University of Cuzco-Peabody Museum site catalog for southern Peru.

Oscar Nunez del Prado, a former student of Rowe's at the University of Cuzco, is preparing a report on the village and burial site of Qaywasara near Curahuasi in Apurimac where he excavated in 1944 a tomb containing a variety of associated objects, including Killke series pottery and a fragment of the fine tapestry with a pattern of interlocking spirals.

Mr. Preston Holder, of Columbia University, has recently returned from Columbia where he was conducting ethnological investigations for the American Museum of Natural History. He reports the following.

Sr. Luis Duque Gomez, Director of the Instituto Nacional, continues grave excavations at San Agustin. Dr. Gregorio Hernandez de Alba is working in the Tierradentro region. Sr. Gerardo Reichel-Dolmatoff, Director of the Instituto de Arqueología y Etnología del Magdalena, is launching an extensive excavation program in that Department. He has recently been excavating at the well-known Tairona site of Pueblito.

It is reported that Dr. Henry Wassen, of Goteborg Museum, Sweden, accompanied by various associates, is due to arrive in Santa Marta in February for a field season which may include archaeological work. It is also reported that a Danish party (staff undisclosed) plans archaeological reconnaissance in the area at the mouth of the Magdalena River this Spring.

Holder further reports on excavations personally conducted at a burial cave near Convencion, probably a Motilon burial site. This identification is, in part, borne out by a series of 25 or 30 house sites stretching about 50 miles to the north up a quebrada from the cave location toward the present heart of Motilon valley bottom country. These sites are identical with those currently occupied by the Motilones. In addition, Holder located an interesting site near Tres Esquinas on the Caqueta headwaters of the Amazon, and made a surface collection of pottery. (*G. R. W.*)

During the summer of 1946, joint excavations were undertaken in Trinidad by Irving Rouse of Yale University and J. A. Bullbrook of the Historical Society of Trinidad and Tobago. Ten stratigraphic trenches were dug in five sites in the southwestern corner of the island, establishing a sequence of four ceramic styles. A number of trade sherds were found, which make it possible to correlate this sequence with others previously established in the Greater Antilles and the Orinoco Valley.

Robert R. Howard will make an archaeological survey of Jamaica this summer in connection with the Yale Caribbean Program, and John M. Goggin will continue his survey of Florida. George D. Howard's paper on lowland South American ceramics, written as part of the program, has recently gone to press. (*I.R.*)

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